Preface

According to the Resolution 28 C/2.4 on Statutory Framework of MAB (Man and Biosphere) Program passed on the 28th session of the UNESCO General Conference, Article 4 has been clearly identified as the criteria which shall be followed by biosphere reserves. In addition, it is stipulated in Article 9 that a Decennium Review shall be conducted on the world biosphere reserve every a decade, this Review shall be based on the report prepared by the relevant authority; the Review result shall be submitted to the relevant national secretariat. The related text of Statutory Framework is attached in Annex 3.

This Review Statement will be helpful for each country preparing national reports and update data as stipulated in Article 9, and the secretariat timely accessing to data associated with the biosphere reserve. This Statement shall contribute to the inspection of MAB ICC on the biosphere reserve, and judge whether it can meet all criteria mentioned in Article 9 of the Legal Framework, especially three major functions. It shall be noted that is required to specify how the biosphere reserve achieves the various criteria in the last part of the Statement (Criteria and Progress).

The information from Decennium Review will be used by UNESCO for the following purposes:

(a) Inspection of the relevant authorities of International Advisory Committee and MAB ICC on the biosphere reserve; and

(b) the world's information system, especially the UNESCO's MAB network and publications, so as to promote communication among people concerned the world biosphere reserve and influence each other.

If it is necessary to keep confidential for any part of this Statement, please state it definitely.

This Statement is composed of three sections:

Part 1 is a summary, it highlights major changes of the biosphere reserve during the report.
period.

- **Part II** is to describe in detail, mainly involving human, physical and biological characteristics and institutional aspects.

- **Part III** is composed of two annexes (A): the first Annex (A. 1) is to update the biosphere reserve directory on MAB website; the second Annex (A. 2) is to provide the promotion and communication materials about biosphere reserve.

The third Annex is the *Statutory Framework* for world biosphere reserve network.

Please provide information and supporting documents as much as possible, in particular:

- Legible maps (see 2.3.1);
- The legal texts specific to various regions.

The Nomination Form, which two copies are submitted to the Secretariat, shall be filled in English, French or Spanish as required below:

1. The original signature, approval certificate, zoning map, and the original or copy of supporting documents shall be provided. Such documents shall be submitted to the Secretariat of UNESCO through the official channels, such as UNESCO National Committee or the standing representative at the UNESCO;

2. The Review Statement and map (especially the zoning map) shall be provided in electronic format (e.g. floppy disks, CD), which can be directly sent to the MAB Secretariat:

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   Division of Ecological and Earth Sciences
   
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   F-75352 Paris Cedex 15, France
   
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### Contents

**Part I Summary**

**Part II: Decennium Review Statement**

1. BIOSPHERE RESERVE: ........................................................................................................................................ 9
2. IMPORTANT CHANGES OF THE BIOPSPHERE RESERVE DURING THE PAST DECADE ........................................................................................................................................ 12
3. ECOSYSTEM SERVICES ....................................................................................................................................... 30
4. THE CONSERVATION FUNCTION ...................................................................................................................... 35
5. THE DEVELOPMENT FUNCTION ..................................................................................................................... 42
6. THE LOGISTIC FUNCTION:.................................................................................................................................. 59
7. GOVERNANCE, BIOSPHERE RESERVE MANAGEMENT AND COORDINATION: .......................... 76
8. CRITERIA AND PROGRESS MADE: .................................................................................................................. 92
9. SUPPORTING DOCUMENTS .......................................................................................................................... 105
10. ADRESSES .................................................................................................................................................... 106
ANNEX .............................................................................................................................................................. 105
PART I: SUMMARY

a) Name of the biosphere reserve:
   Wudalianchi World Biosphere Reserve

b) Country: The People's Republic of China

c) Year of designation: Jul 11th 2003

d) Year(s) of periodic review(s): Not received yet

e) Recommendation(s) made by the MAB-ICC on previous review, if any:
   N/A

f) What follow-up actions are completed and if not completed /initiated, please provide justifications.
   No, as the reviews haven't been conducted before.

g) Improvement on the measures to achieve the objectives of the biosphere reserve.

   Always adhering to the principle of “protection first” since 2003, Wudalianchi World Biosphere Reserve (hereinafter referred to as “the Reserve”) focused on protection of biodiversity and cultural diversity and gave full play to the functions of protection, development and logistics support, so as to make a typical demonstration of the sustainable development for this area, and promote the harmonious construction between human and the nature. The local residents and administrators have made outstanding contributions during protecting the natural ecosystem and enriching the artificial ecosystem.

   Wudalianchi Scenic Spot Management Committee (hereinafter referred to as the “Wudalianchi Committee”) takes some measures, such as sound laws & regulations system, effective management mechanism, planning & monitoring, contracts and tradition, to unify the reserve management and ensure realization of each objective.

   1. Heilongjiang Provincial Government authorized the Wudalianchi Committee to unify the reserve management. Management sectors at all levels shall perform their own functions according to the due responsibilities and mutually cooperate to form a management system at four levels of nation, province, city and Wudalianchi, so as to ensure to orderly protect and manage the Reserve.
2. The management & coordination agency has been improved. Wudalianchi Committee is responsible for planning, protection, monitoring, scientific research, tourism, development, construction and management of the Reserve. The Coordination Commission of Wudalianchi World Biosphere Reserve formed by representatives of stakeholders, was founded in 2006 to coordinate and make decisions on major matters about the Reserve. The various departments of Wudalianchi Committee perform functions of management and supervision on the protection, development and support of the Reserve, each department carries out the effective protection for the natural and human resources of the Reserve through the management station and communities.

3. The protection and restoration of resource has been strengthened. The **Master Plan of Heilongjiang Wudalianchi Volcanic Geological Relics as National Nature Reserve** was compiled, and a local regulation of **Regulation on Heilongjiang Wudalianchi World Geopark Conservation** was issued. It is forbidden to quarry, reclaim, excavate sand or earth or hunt within the Reserve, and some measures have been taken, such as comprehensive afforestation, building footway and protective fence, relocating the enterprises, institutions and residents with threat to the ecological environment, returning farmland to forest, establishing some effective mechanisms, including digital surveillance, personnel management and protection station and vehicle patrolling.

4. The resources have been scientifically utilized to develop tourism, mineral water industry, healthcare industry and cultural industry and processing industry, etc., the local residents' production and living level has been improved significantly.

5. The function of logistics has been strengthened. The scientific research and surveillance has been conducted on many aspects, such as animals, plants, mineral water and geology together with many domestic scientific research institutes and over 10 universities; the popular science propaganda and education has been carried out, the exchanges and cooperation with peer reserves have been promoted, so as to provide the scientific basis for protection and rational utilization of resource and ecosystem.

6. The stakeholders actively participate in. The mechanism has been set up for public participation; the local residents can participate in design and management, preparation of
cooperation plan, plan implementation, and routine management of the biosphere reserve through forms, such as Coordination Commission, symposia, consultation, and environmental protection association.

h) Briefly describe the current periodic review:

In Apr 2013, the evaluation agency was founded, and the stakeholder coordination meeting was held with the original stage review statement filled.

In May 2013, the Chinese MAB Secretariat organized the experts to pre-evaluate the Reserve.

In Jun 2013, the evaluation plan was prepared and the new-stage review statement is filled.

In Jul 2013, the China MAB Council carried out the formal review on Wudalianchi Biosphere Reserve.

In Sep 2013, the China MAB Council submitted a work report to the UNESCO MAB ICC.

In Jun 2014, UNESCO MAB-ICC will hold a meeting to vote on review results.

Fig.1-1 Flow for review on Wudalianchi biosphere Reserve

i) Regional and spatial configuration:

Table 1-1 Summary of area of each functional zone

<table>
<thead>
<tr>
<th>Area of terrestrial</th>
<th>Data in the previous report (nomination form or periodic review)</th>
<th>Proposed changes (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core area(s)</td>
<td>10614.61ha.</td>
<td>10614.61ha. (no change)</td>
</tr>
<tr>
<td>Area of terrestrial</td>
<td>13546.09ha.</td>
<td>13546.09ha. (no change)</td>
</tr>
<tr>
<td>Buffer Zone(s)</td>
<td>81839.30ha.</td>
<td>81839.30ha. (no change)</td>
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<tr>
<td>Area of terrestrial</td>
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<tr>
<td>Transition Zone(s)</td>
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</table>
j) Population variation of the biosphere reserve:

<table>
<thead>
<tr>
<th>Table 1-2 Demographic Statistics</th>
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<tbody>
<tr>
<td>Data in the previous report prior to 2003 (nomination form or periodic review)</td>
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<tr>
<td>Core area(s) (permanent and seasonally)</td>
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<tr>
<td>Buffer Zone(s) (permanent and seasonally)</td>
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<td>Transition Zone(s) (permanent and seasonally)</td>
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</tbody>
</table>

k) Budget (main sources of funds, special capital funds) and international, regional or national relevant projects/initiatives carried out or planned:

<table>
<thead>
<tr>
<th>Table 1-3 Summary of budget</th>
</tr>
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<tbody>
<tr>
<td>Budget in the previous report (nomination form or periodic review) and data</td>
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<tr>
<td>Annual budget capital</td>
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<td>National investment</td>
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<td>Local inputs</td>
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<td>Bank loan</td>
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l) International, regional, multilateral or bilateral framework of cooperation.

Describe, where applicable, the contribution of the biosphere reserve to achieve objectives and developing mechanisms that contribute to the implementation of international or regional bilateral or multilateral agreements, conventions, etc.

Cooperate with research institutes, universities and colleges to strengthen the capability of scientific research and monitoring. The cooperative units include: Heilongjiang Academy of Sciences, Heilongjiang Academy of Forest and Environment, Northeast Forestry University, Northeast Agricultural University, Shanghai Tongji Urban Planning & Design Institute, Nanjing Institute of Environmental Science, MEP, China International Engineering Consulting Corporation, Capital Normal University, Inner Mongolia University, Heihe University, Northeast Normal University, Heilongjiang University, Qiqihar University,
Zhejiang Institute of Geological Survey, Chinese Academy Of Sciences, China University of Geosciences, Tsinghua University and Jilin University.

Cooperate with the domestic and international reserves, strengthen information communication, draw lessons from the advanced experiences, and enhance the capacity of sustainable development. The domestic cooperators include Baotianman Nature Reserve, Xingkai Lake Natural Reserve, and Saihanwula Biosphere Reserve; as well as world Geoparks, such as Yandang Mountains, Zhongnan Mountain, Leiqiong, Stone Forest, Jingbo Lake, Yuntai Mountain, Danxia Mountain and Hong Kong. The international cooperators include Jeju Island in South Korea, Cilento in Italy, Hawaii USA world biosphere reserves, and Eiffel Mountains World Geopark in Germany.
PART II: PERIODIC REVIEW REPORT (Decennium Review Statement)

1. BIOSPHERE RESERVE:

1.1 Year designated: Jul 11th 2003

1.2 Year of first periodic review and of any following periodic review(s) (when appropriate):
   The first periodic review was conducted in 2013.

1.3 Follow-up actions taken in response to each recommendation from the previous periodic review(s) (if applicable), and if not completed/initiated, please provide justifications.
   No review is conducted before.

1.4 Other observations or comments on the above.
   No review is conducted before and no observations or comments available.

1.5 Describe in detail the process by which the current periodic review has been conducted:
   Stage 1: in March 2013, the China MAB Committee issued a circular on review to the reserves in accordance with the requirements of Articles 9 about "regular review" in the Framework for World Network of Biosphere Reserve. Wudalianchi Committee contacted with the Secretariat of China MAB Committee, the Secretariat introduced the basic requirements for the review to the Reserve.
   Stage 2: in April 2013, the Reserve set up a special agency which is responsible for such review work. It hired the Heilongjiang Academy of Sciences and Hydrogeology and Engineering Geology Prospecting Institute of Heilongjiang Province as a technical support team. The Reserve Coordination Commission has held a Conference of Representatives to research such review work; the representatives from the Reserve management organizations, scientific research units, enterprises and institutions, and environmental protection association, and the representative of the local residents participated in the Conference. Wudalianchi Committee has held Party Committee Meetings and coordination meetings to coordinate the review work with stakeholders, invite all stakeholders of the Reserve actively participate in the review; and seriously complete the original Stage Review for World Biosphere Reserve (originally Periodic Review for Biosphere Reserve).
Stage 3: on May 5-7th, 2013, Mr. Ma Xuerong from the Secretariat of China MAB Committee invited five experts (Prof. Wang Cheng and Xie Yan from Chinese Academy of Sciences; Prof. Guo Chunjing from Heilongjiang Academy of Sciences; as well as Prof. Zhou Haixiang and Ma. Yang Weihe from Shenyang Ligong University) to conduct a pre-review on the Reserve for three days. The Wudalianchi Committee reported the relevant works over 10 years, the experts carried out a field visit, and held an investigation & communication meeting to put forward some suggestions on improvement of such review.

Stage 4: in May- July 2013, the Secretariat of China MAB Committee sent a new form of stage review (UNESCO - MAB Program - UNESCO-MAB Program- Periodic Review for Biosphere Reserve—Jan 2013) to the Reserve. The Wudalianchi Committee formulated a review plan and defined the review subject. Each department of the Reserve collaborated each other and jointly undertake review tasks of biosphere reserve in accordance as required.

Stage 5: in July 2013, a formal field review was conducted on the Reserve by a dozen of experts, including Xu Zhihong, academician of Chinese Academy of Sciences and Chairman of the China MAB Committee; Wang Ding, Secretary-General; Tao Siming, Assistant Inspector of Department of Ecological and Natural Conservation, MEP; Guo Chunjing, Vice President of Heilongjiang Academy of Sciences; Chen Liwei, Director of government relations of the Natural Conservancy and member of the China MAB Committee; Han Tonglin, researcher of the Chinese Academy of Geological Sciences; Hong Tianhua, Deputy Director of HIST (International Centre on Space Technologies for Natural and Cultural Heritage under the Auspices of UNESCO); and Ma Xuerong, Business Supervisor. The Wudalianchi Committee reported major changes of biosphere reserve over past ten years, and held a series of conferences, such as report-back meeting, exchange meeting, and stakeholder symposium.

Stage 6: in Sept 2013, China MAB Committee completed the inspection report and submitted the work report to the MAB-ICC. Biosphere Reserve Advisory Committee reviewed the report, and provides some suggestions to the MAB-ICC.
Stage 7: in Jun 2014, MAB-ICC convened a meeting to vote whether the Reserve can pass through the review.

Table 2-1 Schedule for the Reserve review

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<td>Stage 3</td>
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<td>Stage 4</td>
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<td>Stage 5</td>
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<td>Stage 6</td>
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<tr>
<td>Stage 7</td>
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1.5.1 Which stakeholders were involved?

The stakeholders from different backgrounds actively involved in the review during the review on the Reserve. Major stakeholders include: Wudalianchi Committee (the government), scientific research institutions, the local community residents and staff, mineral water processing enterprises, state farms, nursing homes, hotels, environmental protection association, tourists and other enterprises and institutions, etc.

1.5.2 What methodology was used to involve stakeholders in the process (e.g., workshops, meetings, consultation with experts)?

During the review, the Biosphere Reserve Coordination Commission convened the representatives meeting, coordination conference, party committee meeting, working meeting of director, workshops, job meeting, and expert consultation, etc. as required; with above means, each stakeholder can involve in the decennium review on biosphere reserve. The Coordination Commission carries out investigation in the form of seminars, hearing or workshop, to understand their basic understanding and comments on the past decade; the stakeholder can also participate in review on the Reserve by means of public solicitation from local residents, questionnaires, seminars, or preparatory committee, etc.
1.5.3 How many meetings, workshops, etc. occurred throughout the process of conducting this review?

Coordination Commission actively organizes meetings and seminars, including: 3 coordination meetings, 12 special sessions, 3 party committee meetings, 6 community conferences on joint development, 8 expert consultations, 2 seminars on harmony between man and nature, 2 pre-review meetings, and 3 action meetings of environment protection volunteers.

1.5.4 Were they well attended, with full and balanced representation?

(Describe participation and stakeholders).

Each conference has different participants which can basically stand for all stakeholders with full and balanced representation. For example, the representatives meeting of the Reserve Coordination Commission was held for all stakeholders, the Coordination Commission has 55 members totally (11 women members contained), including 28 members from Wudalianchi Committee, 6 members from the surrounding city and county governments, and other 21 members from enterprises and institutions, environmental protection association, residents and villagers committees, individual & private business association, and the advisory committee. The stakeholders for symposia and coordination meeting come from different industries and areas. The party committee meeting and working meeting of director are specific to the staff of Wudalianchi Committee. The stakeholders of community conferences on joint development primarily consist of community residents. Pre-review meeting is organized by the China MAB network. In each meeting, local residents, women, and young people account for a certain proportion.

2. IMPORTANT CHANGES OF THE BIOSPHERE RESERVE DURING THE PAST DECADE

2.1 Brief summary overview: Narrative account of important changes in the local economy, landscapes or habitat use, and other related issues. Note important changes in the institutional arrangements for governance of the biosphere reserve area, and changes (if any) in the coordinating arrangements (including the biosphere reserve
organization/coordinator/manager) that provide direction for the biosphere reserve. Identify the role of biosphere reserve organization/coordinator/manager in initiating or responding to these changes.

Since the Reserve joined the world biosphere network, the Reserve follows the concept of harmony and win-win between man and nature, and the guidance of "strict protection, scientific planning, unified management, reasonable development and sustainable utilization" in accordance with the requirement of "three major functions" and "seven criteria" of world biosphere, to change the past pattern of economic development with priority given to the agriculture and rehabilitation, rationally utilize natural resources, and strengthen industries of tourism, healthcare, mineral water and green agriculture. Wudalianchi Committee subsequently formed some relevant departments, including the environmental protection administration, forestry administration, water supply administration and animal husbandry administration, so as to strengthen resources management, it has established and improved 160 rules & regulations, set up the Coordination Commission composed of stakeholders, established and perfected the management and construction of systems and mechanisms of which all people within the Reserve can involve; and formed the management system organized and leaded by Wudalianchi Committee and actively participated in by stakeholders.

2.2 Updated background information about the biosphere reserve.

2.2.1 Updated coordinates (if applicable). If any changes in the biosphere reserve’s standard geographical coordinates, please provide them here (all projected under WGS 84):

No change occurred, the coordinates of the Reserve see as Table below:

<table>
<thead>
<tr>
<th>Cardinal points:</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most central point:</td>
<td>48°43'48&quot;</td>
<td>126°14'57&quot;</td>
</tr>
<tr>
<td>Northernmost point:</td>
<td>48°48'28&quot;</td>
<td>126°11'59&quot;</td>
</tr>
<tr>
<td>Southernmost point:</td>
<td>48°34'23&quot;</td>
<td>126°16'42&quot;</td>
</tr>
<tr>
<td>Westernmost point:</td>
<td>48°42'43&quot;</td>
<td>126°00'40&quot;</td>
</tr>
<tr>
<td>Easternmost point:</td>
<td>48°43'58&quot;</td>
<td>126°26'33&quot;</td>
</tr>
</tbody>
</table>
2.2.2 If necessary, provide an updated map on a topographic layer of the precise location and delimitation of the three zones of the biosphere reserve. Map(s) shall be provided in both paper and electronic copies. Shape files (also in WGS 84 projection system) used to produce the map must also be attached to the electronic copy of the form.

If applicable, also provide a link to access this map on the internet (e.g. Google map, website).


2.2.3 Changes in the human population of the biosphere reserve. Most recent census data:

It is indicated from 2010 Sixth National Population Census (the latest Census) that the total population within the Reserve is 56308, 308 more than that in 2003.

2.2.4 Update on conservation function, including main changes since last report.

(Note briefly here and refer to 4 below).

After Wudalianchi Committee was established, especially since it joined the world MAB network in 2003, major changes occurred at the conservation function of the Reserve with conservation consciousness increasingly enhanced, protection measures come into being, conservation increasingly growed, and protection ability continuously strengthened, which mainly reflect in:
1. Really set up the concept of "protect first". All decisions and development shall be carried out under the premise of strict protection.

2. Firstly establish the laws and regulations, strictly enforce the applicable laws and regulations, such as Regulations of the People's Republic of China on Nature Reserves. In 2006, Regulation on Protecting Heilongjiang Wudalianchi World Geopark was promulgated by Heilongjiang Provincial Peoples Congress, and it was revised to strengthen protection and management in 2010, which provides the statutory supports for protection and management of the Reserve. Prepared 10 plans, such as Master Plan of Heilongjiang Wudalianchi Volcanic Geological Relics as National Nature Reserve, all of which provide a clear direction and guidance for protection, development and logistical support of the Reserve.

3. Demarcate, set up a boundary post and scientifically regionalize the functions; since Wudalianchi becomes a biosphere reserve, the detailed demarcation has been carried out for reserve boundary, core area, buffer zone and transition zone through setting up the boundary posts for nature reserve, adding permanent identification, boundary pillars and boundary markers; the different protection measures have been taken for each functional zone, which effectively protect the integrity and biodiversity of the ecosystem.

4. Increasingly protect and restore resources: in 2004, Wudalianchi Committee determined to stop cutting trees, comprehensively facilitate afforestation on the mountainous areas; relocated 5264 residents in the core and buffer zones; returned 22685 mu farmland to forest, grassland or wetland; increased investment in the projects to restore the ecological environment suffered from natural and artificial damage; close the small individual kill well; so that the ecological resources and environment of the Reserve can be protected and restored well, as shown in Fig. 2-2.
5. Strengthen build the capacity for resource management and protection, prohibit any behaviors potentially impact the environment and resources in the Reserve: the capacity of the Reserve for resources conservation and management was very limited before 2003; with development of ten years, the Reserve has been established a digital monitoring system and set up 18 management stations, equipped with 27 patrol chariots, and formed 8 inspection teams for forestry, land, and environmental protection, etc., a multi-level, all-dimensional system for resources management and protection has been basically established which combined the electronic monitoring, artificial patrol, patrol vehicles, as shown in Fig. 2-3 and 2-4 below. Wudalianchi Committee further intensify protection of resources and ban may affect any behaviors potentially impact the environment and resources, so that the environment and resources can been further protected.

6. Participation by all people and co-management by society: the Reserve pays more attention to the all round participation of residents, enterprises and institutions, social organizations after it joined the World MAB Network. With development over ten years,
the enterprises and institutions have own part-time staff responsible for environmental protection in addition to full-time staff at present; the environment association also established environmental volunteer team; the Reserve management agency has hired some environmental supervisors; the resource management protection level has improved under the broad participation of whole society. With joint efforts of the reserve management agency and all people within the Reserve over ten years, the ecosystem in the Reserves has been effectively protected and restored, the ecological environment has been significantly improved, a scientific development path has been explored for harmony between man and the nature within the Reserve.

2.2.5 Update on the development function, including main changes since last report.

(Note briefly here and refer to 5 below).

Since the Reserve joined the World Biosphere Network, there are new changes take place on development concept and pattern.

1. Further transfer development concept and pattern: Development is for the sake of better protection, while protection is for the sake of further development. So it is to adjust the industrial structure of the Reserve, develop green economy and local characteristic economy. The economic development and social and cultural development shall support each other. The Reserve shall conduct the environmental impact assessment for all construction projects; all enterprises into the Reserve shall reasonably utilize resources of the Reserve, it is strictly prohibited that enterprise which may cause pollution, damage the environment, or affect ecology is settled in the Reserve.

2. Foster and promote the development of leading industry and improve people's living standards: the Reserve closely focuses on the leading industries, such as "tourism economy, healthcare economy, mineral spring economy and green agricultural economy", and follows the path for ecological, intensive development. For ten years, the tourism infrastructure got rapid development from the imperfect to the basically sound; the tourists increased from 190000 in 2003 to 1.25 million in 2012, accordingly ticket sales increased from RMB 5.8 million in 2003 to RMB 37 million in 2012. Tourism output rose from RMB 40 million in 2003 to RMB263 million in 2012. Wudalianchi mineral
water not only can strengthen physical health, but also has obvious curative effect for a variety of diseases; the healthcare visitors increased from 100000 in 2003 to 300000 in 2012. Through consolidation of the mineral water enterprises and closure of some small size and energy intensive water plants, the intensive development of mineral water industry has obtained on the basis of the existing mineral water enterprises with output value up to RMB 128 million. In addition, the Reserve has adjusted structure of its planting industry, promoted the application of pesticide with low toxicity and low residual, tested soil to formulate fertilization, and developed green agriculture and tourism agriculture.

3. Strengthen the skills training and guide residents transfer mode of production and living: Since the Reserve joined the biosphere network, development of the Reserve provide more opportunities and jobs to increase the residents’ income, and provides the guarantee for ecological protection and restoration, improvement of the living level of local residents. For ten years, Wudalianchi Committee, together with the local residents timely grasp the opportunity and take a series of measures to promote the ecological restoration and improvement of people's income. Through the ecological migration and returning farmland to forest, grassland or wetland, the Reserve promotes development of tourism and mineral water industry, guides the residents transfer from the original income mainly based on the farming to the emerging industries, such as agriculture with high added value, business, hotel, restaurant, tour guide, taxis, and souvenirs, the local residents’ incomes are increased rapidly. Through relocating the residents from the core and buffer zones to a new tourism town of high taste, the living standard of the residents has been improved and enhanced, and the human activities threat to the ecology has been eliminated. With returning farmland to forest, grassland or wetland, the land users are liberated from the traditional low-income farming, and relocated by the government, their income have been increased significantly.

4. Create an "ecology, health, leisure and culture" reserve for the coordinated development of economy, society and culture. For a past decade, the Reserve paid more attention to construction of "ecology, health, leisure and culture" reserve, inherited and cultivated
holy-water culture and religious culture, enriched and promoted connotation and taste of the Reserve when accelerating economy development, so as to harmoniously develop economy, society and culture of the reserve.

For a decade, led by Wudalianchi Committee, various undertakings of the Reserves have made remarkable development. The economy of the Reserve was slowly developed and remained at the low level before 2003; the regional GDP is developed from RMB 90.88 million in 2003 to RMB 415.54 million in 2012. Urban residents income increased from RMB 4420 yuan in 2003 to RMB 15468 in 2012.

The farmers' income increased from RMB 1560 in 2003 to RMB 7130 in 2012. See Fig. 2-7 below. Development function of the Reserve played very well, the ecological value has been obviously improved, the society and economy got rapid development.
2.2.6 Update on logistic support function, including main changes since last report.

(Note briefly here and refer to 6 below).

After the Reserve joined the MAB network, Wudalianchi Committee actively explored ways for sustainable development and constantly promoted construction of the logistics function facilities, so as to support management and development of the Reserve well; constantly improved the scientific research and monitoring capacity of three professional institutions within the Reserve, including volcanic seismic station, volcanic & mineral water institute and environmental monitoring station. Eight domestic and abroad institutes, 15 universities have carried out the scientific monitoring within the Reserve, a lot of important achievements has made with about one thousand papers related to the Reserve published on the domestic and abroad journals. Through sharing information and knowledge, Wudalianchi Committee converted these important achievements into the powerful technical supports to strengthen the conservation and development function, so as to improve the logistics support function. Wudalianchi Committee invited some domestic and international experts for lectures and discussion; sent local personnel to learn the advanced experience and concepts of other biospheres; held various seminars and workshops; compiled the basic knowledge about the Reserve into local teaching material; opened up courses in primary and middle school and carried out education training for the Reserve resident; the trained personnel accounts for over 60% of total population within the Reserve. Museum and science museum have been successively built, a large-scale comprehensive museum with area of 13644 m² is under
construction. Over 6000 pieces of information on the Reserve have been published or broadcast on the various media, such as network and television. Wudalianchi Committee strengthened the exchanges and cooperation with domestic and foreign reserves; over 170 domestic and international experts and scholars have investigated and researched the scenic spot. Wudalianchi Committee conducted exchanges and cooperation with eight domestic and international reserves, and became sister biosphere reserves with five domestic reserves and two international reserves; and concluded an intention to become sisters biosphere reserve with the last one.

2.2.7 Update on governance management and coordination, including changes since last report (if any) in hierarchy of administrative divisions, coordination structure.

(Note briefly here and refer to 7 below).

After Wudalianchi became a biosphere reserve, in order to better management and coordination for the Reserve, Wudalianchi Committee adheres to the world advanced management concept, and has made new development in management department and coordination structure. Before 2003, Wudalianchi Committee only had a land & resources agency responsible for resource conservation and management; in order to strengthen conservation, management and utilization of resources, Wudalianchi Committee has successively established the environmental protection agency, forestry agency, water agency and animal husbandry agency for administration management in the past 10 years. The Reserve Coordination Commission was established in 2006, which is composed of by representatives from Wudalianchi Committee, the surrounding cities and counties, enterprises and institutions, environment association, advisory committee, individual association and local residents in certain proportion. All major policy decisions and important issued about the Reserve shall be passed through the Coordination Commission. For coordination and management of the Reserve, the Coordination Commission will extensively absorb stakeholders within the Reserve to involve in through seminars, consultation, mediation or soliciting comments, etc. as required, so as to form a universal participation in the management and development of the Reserve.

2.3 The authority/authorities in charge of coordinating/managing the biosphere reserve:
(Comment on the following topics as much as is relevant).

2.3.1 Updates to cooperation/management policy/plan, including vision statement, goals and objectives, either current or for the next 5-10 years

According to the spirit of *Seville Strategy* and *Madrid Plan of Action*, as well as the state policies and guidelines and provincial and municipal deployment, the Reserve will more fully play functions of conservation, development and logistics support in future; build an environment-friendly and resource-saving reserve with the convenient traffic, sound service facilities, highly developed ecological industry, social harmony and stability and rich people's livelihood, and realize the sustainable development and harmony between human and the nature; actively participate in communication and cooperation of the world biosphere reserve network, so as to make greater contribution for the world biosphere network.

The next 5-10 years target of the Reserve is to create a demonstration of world biosphere reserve of sustainable development and harmony between man and nature; to create "ecology, health, leisure and culture" reserve through unremitting efforts of the people within the reserve according to the blueprint drawn by *Master Plan of Heilongjiang Wudalianchi Volcanic Geological Relics as National Nature Reserve* (2001-2020), so that the ecological environment in the Reserve becomes more beautiful, economy and society get more rapid development, and logistical support becomes more powerful; thus sky of the Reserve gets more blue, water cleaner, biology richer, people more rich, and contribution of the network more significant.

2.3.2 Budget and staff support, including approximate average annual amounts (or range from year-to-year); main sources of funds (including financial partnerships established (private/public), innovative financial schemes); special capital funds (if applicable); number of full and/or part-time staff; in-kind contribution of staff; volunteer contributions of time or other support.

Since Wudalianchi became a world biosphere reserve, the functions of conservation, development and logistical support are received more and more attentions, accordingly the budget expenditures are increased constantly. The Reserve staff is also increased with full-time/part-time staff from 198/30 in 2003 to 276/56 in 2012. Main capital sources include...
state transfer payment, state project investment, self-financing of the Reserve, bank loans, and invited investment, etc.

![2003-2012 fiscal budget of Wudalianchi Biosphere Reserve](image)

Staff of the Reserve commits to the conservation and development; they also voluntarily contribute average 2 hours/week in addition to eight work hours per day to the Reserve every week. Staff of the Reserve and enterprises actively supports construction of the Reserve, voluntarily contributed RMB 20 million for holy-water festival, tourism publicity and construction of museum. The environmental volunteers of the Reserve voluntarily contribute average 12 hours per week to participate in the regulatory of environmental protection, popular science propaganda and cultural publicity activities.

2.3.3 Communications strategy for the biosphere reserve including different approaches and tools geared towards the community and/or towards soliciting outside support.

The Reserve mainly carries out propaganda and communication through Wudalianchi official website, video and picture album, constantly updates information and enriched content. For the internal communication, the Reserve coordination meeting is primary method; for social communication, various means can be adopted, such as symposium, consultation, questionnaires and public comments; for external communication, the following methods are mainly adopted, including the presentation on the Reserve at the domestic and abroad, exchanges and cooperation, network (Email), the official weibo, reciprocal visits, and participation in the domestic and international conferences, etc.

2.3.4 Strategies for fostering networks of cooperation in the biosphere reserve that serve as connections (“bridging”) among diverse groups in different sectors of the community.
(e.g. groups devoted to agricultural issues, local economic development, tourism, conservation of ecosystems, research and monitoring).

Wudalianchi Committee is responsible for various management works of the Reserve, including resource protection, economic development, logistics support, social undertakings and so on; organizes and coordinates various departments and groups to actively participate in the ecosystem protection and local economic development, scientific research and monitoring with administrative, economic, judicial means or negotiation and by means of information provision, scientific research cooperation, technical service and market analysis.

2.3.5 Particular vision and approaches adopted for addressing the socio-cultural context and role of the biosphere reserve (e.g. promotion of local heritage resources, history, cultural and cross-cultural learning opportunities; cooperation with local population; reaching out to recent immigrant groups, indigenous people etc.).

The Reserve is a settlement of various nationalities, such as Daur, Oroqen, Mongolian, Manchu and Han; these nationalities harmoniously live together and create the history and culture of the Reserve. The Reserve protects and inherits cultural of the indigenous population through holding holy water festival, minority literary performance, cultural county and temple fair.

2.3.6 Use of traditional and local knowledge in the management of the biosphere reserve.

The Reserve managers respect the local traditions and apply traditional knowledge to manage the Reserve. Mineral water resources is the precious local resources, the Reserve strengthens management and construction of mineral water resources, respects the local residents’ lifestyle taking water as holy, the mineral water resource can be protected through the holy water festival; important volcano and lakes have been named with the local knowledge and such custom is followed; The traditional dress and activities are respected.

2.3.7 Community cultural development initiatives. Programmes and actions to promote community language, and, both tangible and intangible cultural heritage. Are spiritual and cultural values and customary practices promoted and transmitted?

As the Reserve is located in the north of China, it inherits the cultural diversity for ten years in order to enrich the public life; all kinds of festival activities are held every year, such
as the Spring Festival, holy water festival, tomb-sweeping day, Mid-Autumn festival, Lantern Festival, a volcano spring festival and volcanic ice & snow festival. Couple Dance Opera, a kind of northeast local opera, and Yangge Dance, the northeast traditional custom, are popular public activities, combining say, sing and dance, not only enrich the spare life of the masses, but also promote unity of various local nationalities.

2.3.8 Specify the number of spoken and written languages (including ethnic, minority and endangered languages) in the biosphere reserve. Has there been a change in the number of spoken and written languages? Has there been a revitalization programme for endangered languages?

The number of oral and written languages does not change. The primary language of the Reserve is mandarin in China, and there are also some languages from different areas and nationalities, including the northeast dialect, Mongolian, Oroqen language, Manchu and Daur language. For example, the landscapes, such as volcano and lake here have been named in Daur language in history, which have got the due respect, protection and inheritance.

2.3.9 Management effectiveness. Obstacles encountered in the management/coordination of the biosphere reserve or challenges to its effective functioning.

Due to the historical reasons, there are some enterprises and institutions in the Reserve, such as agricultural reclamation farm, troop farm, Daqing farm, hotel and nursing homes, etc, which are independent business units with making profit as the purpose under certain competent sectors. Although the Wudalianchi Committee exercises the "unified planning, protection, development and management" for the Reserve and set up the Reserve Coordination Commission; however, as the contradiction is inevitably existed between protection and development, the enterprises engaged in the resource protection and resource utilization often pursue a higher economic efficiency, so some contradictions may be caused with the Reserve management department.

2.4 Comment on the following matters of special interest in regard to this biosphere reserve:

(Refer to other sections below where appropriate).
2.4.1 Is the biosphere reserve addressed specifically in any local, regional or/and national development plan? If so, what plan(s)? Briefly describe such plans that have been completed or revised in the past 10 years.

There are some descriptions relate to Wudalianchi Reserve in the state, Heilongjiang provincial and regional plans, such as *National Planning for Transition of Greater and Lesser Khingan Mountains*, *Planning on Songhua River Basin Management*, *Planning on Better Lakes Conservation*, and *Demonstration of Biodiversity Projects*. The expressway from Harbin to the Reserve has been opened to traffic; Wudalianchi Airport has been included in the "12th Five-Year" National Development Planning and will be started in 2013. In addition, the "11th Five-Year" Planning and the "12th Five-Year" Planning of Heilongjiang Province and Heihe City and other plans all list the Reserve as a special zone for key development. The Reserve has completed and revised 10 plans involving in various aspects for ten years, such as the *Master Plan of Heilongjiang Wudalianchi Volcanic Geological Relics as National Nature Reserve* (2001-2020), and *Master Plan of Famous Tourism Towns in Wudalianchi* and so on.

2.4.2 Outcomes of management/cooperation plans of government agencies and other organizations in the biosphere reserve.

Since Wudalianchi Reserve joined the world biosphere reserve network, Wudalianchi Committee always takes the reserve planning as the starting point and objective of management and development. Upholding the concept of “conservation and development aim to benefit and enrich the people, and promote happiness for the people” for ten years, the remarkable achievements have made in the Reserve at various aspects, including management and coordination, conservation and development, scientific research and monitoring, education and training, the sustainable development of regional economy and so on. In 2010, Wudalianchi Committee is ranked as a honorary title of "Advanced Collective of Provincial Natural Reserve" in Heilongjiang. Through implementation of comprehensive environmental control, the ecological environment of the Reserve has been fully optimized; the taste of landscape has been effectively promoted. Especially after returning farmland to forest, grassland or wetland, more birds and wildlife are also attracted to multiply here. The living
conditions of indigenous people have been improved; the rare geological relics and biodiversity have been protected through ecological relocation and construction of service functional zone. With development of tourism, healthcare, mineral water and cultural industries, Wudalianchi Reserve has stepped on a road for green, low-carbon and sustainable development, promoting the employment transition and steady increasing incomes of residents. Through promoting monitoring, scientific research, public education and exchanges with foreign countries, the scientific basis is provided for conservation and rational utilization of resource and ecosystem, Wudalianchi Reserve has played its role in the world biosphere network, promoted its influence among the international biosphere reserves, and also made positive contributions to disseminating the ecological and geological knowledge, and researching the sustainable development between human and nature.

2.4.3 Continued involvement of local people in the work of the biosphere reserve. Which communities, groups, etc. How are they involved?

Since Wudalianchi Reserve joined the world biosphere reserve network, Wudalianchi Committee focuses on playing an important role of local residents in the reserve management; all undertakings of the Reserve can not be smoothly realized without supports of the local residents. For ten years, the Reserve has successively formed various organizations, such as the Reserve Coordination, Environment Association and advisory committee, widely absorbs the residents participate in management through seminars, consultation and hearing, and public suggestions.

2.4.4 Women’s roles. Do women participate in community organizations and decision-making processes? Are their interests and needs given equal consideration within the biosphere reserve? What incentives or programmes are in place to encourage their representation and participation? (e.g. was a “gender impact assessment” carried out?) Are there any studies that examine a) whether men and women have different access to and control over sources of income and b) which sources of income do women control? If so, provide reference of these studies and/or a paper copy in an annex.

In China, women enjoy equal rights with men, so does the Reserve; women have the equality with men in aspects of right to vote, voting rights, education and labor, and
participation. For the Reserve Coordination Commission, women account for 20% of total members, women and men have equal pay for equal work without discrimination existed here. Women have a special organization, such as women's union. There are also many incentive mechanisms to encourage women's development, for example: women pace-setter, meritorious award, etc.

2.4.5 Are there any changes in the main protection regime of the core area(s) and of the buffer zone(s)?

In the past decade, there is no change for ranges of core area and buffer zone and administrative system, while the protection system was developed and improved. In order to reduce influence of human activities on the core area and buffer zone, the residents of the core area have been relocated, only a few people live in the buffer zone. The main landscape resources of Wudalianchi are volcanic geological relics and biodiversity; since it was approved as national scenic area in 1982, the tourism activities are appeared in the core area. After Wudalianchi became the Reserve, in order to further strengthen protection of the core area, and let more people know about the new period of volcanic geology and geological knowledge (the plants within the Reserve grow quickly, new lava platform will be covered by vegetation after some years), the Reserve has made a series of protective measures to strengthen protection of the core area and control quantity of visitors to the core area, and built a tour plank road, protection fence and sign board for dotted line tourism, visitors can only view and learn on the plank road, which won’t affect the ecosystem protection. In addition, the Reserve also promotes the ecological restoration in core area and buffer zone after returning farmland to forest, grassland or wetland in the core area and buffer zone.

2.4.6 What research and monitoring activities have been undertaken in the biosphere reserve by local universities, government agencies, stakeholders and/or linked with national and international programs?

In order to scientifically manage the Reserve and reasonably use the Reserve resources, Wudalianchi Committee has carried out the scientific research and monitoring on the Reserve jointly with many research institutes and colleges & universities, mainly including: the CAS Institute of Botany, Heilongjiang Academy of Sciences, Heilongjiang Academy of
Sciences-Institute of Natural Resources, Nanjing Institute of Environmental Science, MEP, Zhejiang Institute of Geological Survey, Hydrogeology and Engineering Geology Prospecting Institute of Heilongjiang Province, Chinese Academy of Agricultural Sciences, Heilongjiang Fisheries Research Institute, China University of Geosciences, Capital Normal University, Inner Mongolia University, Jilin University, Northeast Forestry University, Northeast Agricultural University, Shenyang Ligong University and Qiqihar University, etc. The above institutes and universities have respectively carried out the research on the ecological geology, animal and plant species and populations, ecosystem, mineral water resources, volcanic geological relics, volcanic lake berth, hydrological biology, and aquatic resources of the Reserve. (Please refer to the Annex 9-6 Bibliography).

Three scientific research and monitoring institutions have been successively set up within the Reserve to regularly monitor Wudalianchi volcanic earthquake, mineral water, surface water and atmosphere, including Wudalianchi Volcanic Earthquake Monitoring Station, Heilongjiang Academy of Sciences-Institute of Volcano and Spa, and Heilongjiang Wudalianchi Environment Monitoring Station.

2.4.7 How have collective capacities for the overall governance of the biosphere reserve (e.g. organization of new networks of cooperation, partnerships) been strengthened?

Wudalianchi Committee highly focuses on building comprehensive management capacity of the Reserve; organized stakeholders within the Reserve to form a Coordination Commission; hired experts and scholars as consultants; joint constructed with the surrounding cities and counties; and cooperated with colleges and universities; all of which greatly improved the collective capacity for comprehensive management.

2.4.8 Please provide some additional information about the interaction between the three zones.

The Reserve has been scientifically divided into three functional zones, namely core area, buffer zone and transition zone, which jointly promote to realize the functions of conservation, development and support of the Reserve. Among them: the main function of core area is to play conservation function to protect sustainable development of volcanic ecosystem; Monitoring and research activities are mainly conducted in the buffer zone which mainly
undertakes the functions of conservation and support, and research the ecological changes and mechanisms of scientific development; Human economic activities are mainly carried out in the transition zone, which has functions of conservation, support and development, so it undertakes the important functions of the economic development and improvement of people's living standards. Three functional areas support and interact each other, and jointly contribute to the harmony between man and nature as well as economic sustainable development within the Reserve.

2.4.9 Participation of young people. How were young people involved in the organizations and community decision-making processes? How were their interests and needs considered within the biosphere reserve? What are the incentives or programs in place to encourage their participation?

As the future backbone of the Reserve, engagement of young people is highly valued by Wudalianchi Committee, so it is important to build their capacity to participate in management and development. China communist youth league has been formed in the Reserve, which is an important constituent of Wudalianchi Committee, also is a major way for young people to participate in the politics. The special courses about Reserve knowledge have been set at the primary and secondary school in the Reserve, so as to cultivate the consciousness of protecting the Reserve since the childhood, and cultivate young people to love and contribute to the Reserve by various means of expert lectures, scientific training, organization activities, etc. The forms, such as selection of the excellent league member and China Youth Day Commendation, are carried out to encourage more young people involve in production and living of the Reserve.

3. ECOSYSTEM SERVICES

3.1 If possible, provide an update in the ecosystem services provided by each ecosystem of the biosphere reserve and the beneficiaries of these services.

(As per previous report and with reference to the Millennium Ecosystem Assessment Framework and The Economics of Ecosystems and Biodiversity (TEEB) Framework
In the past over 10 years, service functions of the natural ecosystem has been constantly resuming. Among all the five service functions of the forest ecosystem, the ecological service funtions plays a great role. Due to the ban on timber, forest works get their income from the mangement of the forest. Service functions of the wetland ecological systems and bushwood and meadow ecological systems have not changed. As farmland nearby has been converted into forest, surface runoff from non-point source pollution has been effectively controlled, and the water purification and regulation functions of the aquatic ecosystem has also been enhanced. In spite of a reduction area of farmland, the supply function of the farmland ecosystem remains unchanged due to changes in crop varieties and the development of sightseeing agriculture and picking agriculture. Service functions of the 5 ecosystems are as shown in Table 3-1, Table 3-2, Table 3-3, Table 3-4 and Table 3-5 respectively.

### Table 3-1 Services of the forest, meadow and grassland vegetation ecosystem

<table>
<thead>
<tr>
<th>Services of the ecosystem</th>
<th>Beneficiary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplying function</td>
<td>Mushrooms,wild vegetables and other wild food; gene and genetic information</td>
</tr>
<tr>
<td>Regulating function</td>
<td>Water conservation, soil conservation, carbon fixation and oxygen release</td>
</tr>
<tr>
<td>Cultural function</td>
<td>Leisure, appreciation, ecological tourism and education</td>
</tr>
<tr>
<td>Supporting function</td>
<td>Soil forming, nutrient cycling and animal habitant</td>
</tr>
</tbody>
</table>

### Table 3-2 Services of the ecosystem consisting of lichen and bush vegetation

<table>
<thead>
<tr>
<th>Services of the ecosystem</th>
<th>Beneficiary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplying function</td>
<td>Wild vegetables; gene and genetic information</td>
</tr>
<tr>
<td>Regulating function</td>
<td>Soil conservation</td>
</tr>
<tr>
<td>Cultural function</td>
<td>Amusement, ecological tourism and education</td>
</tr>
<tr>
<td>Supporting function</td>
<td>Soil forming, nutrient cycling and animal habitant</td>
</tr>
</tbody>
</table>
Table 3-3 Services of the lowland and wetland meadow vegetation ecosystem

<table>
<thead>
<tr>
<th>Services of the ecosystem</th>
<th>Beneficiary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplying function</td>
<td>Fish, fresh water, mushrooms, fibers, gene and genetic information</td>
</tr>
<tr>
<td>Regulating function</td>
<td>Water conservation, soil conservation, carbon fixation and oxygen release, air purification and water purification</td>
</tr>
<tr>
<td>Cultural function</td>
<td>Leisure, appreciation, ecological tourism and education</td>
</tr>
<tr>
<td>Supporting function</td>
<td>Solid conservation, nutrient cycle and habitat for animals</td>
</tr>
</tbody>
</table>

Table 3-4

<table>
<thead>
<tr>
<th>Services of the ecosystem</th>
<th>Beneficiary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplying function</td>
<td>Fish, fresh water, gene and genetic information</td>
</tr>
<tr>
<td>Regulating function</td>
<td>Water conservation, air regulation and water purification</td>
</tr>
<tr>
<td>Cultural function</td>
<td>Leisure, appreciation, ecological tourism and education</td>
</tr>
<tr>
<td>Supporting function</td>
<td>Nutrient cycle and habitat for animals</td>
</tr>
</tbody>
</table>

Table 3-5 Services of farmland ecosystem

<table>
<thead>
<tr>
<th>Services of the ecosystem</th>
<th>Beneficiary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplying function</td>
<td>Grain, fruits and vegetables, medicinal materials, fuels, fibers; gene and genetic information</td>
</tr>
<tr>
<td>Regulating function</td>
<td>Carbon fixation and oxygen release</td>
</tr>
<tr>
<td>Cultural function</td>
<td>Leisure, ecological tourism and education</td>
</tr>
<tr>
<td>Supporting function</td>
<td>Primary production, nutrient cycling and soil formation</td>
</tr>
</tbody>
</table>

3.2 Specify if there are any changes regarding the indicators of ecosystem services that are being used to evaluate the three functions (conservation, development and logistic) of the biosphere reserve. If yes, which ones and give details and update.

Based on 10 years of implementation, ecosystem service functions of the nature conservation area have been enhanced, and positive changes have been seen in some indicators, such as the reduction in timber and fuel consumption, because an increasing number of local enterprises and inhabitants choose to use clean energies. Over the past 10
years, the forest land increased 3516 hectares in total, and the forest area has increased from 26,787 hectares in 2003 to 30,303 hectares today, and the forest coverage rate increased from 25.3% when it joined the nature conservation area to current 28.6%, and the new forestland may absorb carbon dioxide of 70,320 tons to 140,640 tons per year (equal to 19,162.2 tons to 38,324.4 tons in carbon content), release 52,740 -70,320 tons of oxygen, retained a total of 1,758,000-7,032,000 m³ of water. In addition, lake water quality has been improved greatly, shifting from Type IV water body to Type III water body, lake aquatic organisms increased, too, and aquatic products have also increased. With the improvement of environment quality and landscape beauty, tourism industry has also developed well, the number of visitors has been growing at an annual rate of 17.8%, and by 2012, a total of 125 tourists visited here. In addition, with the improvement in comprehensive services of the ecosystem such as carbon fixation, oxygen release, water conservation and fainfall, the ability to withstand natural disasters has also been strengthened. Under the same natural conditions, both rop yield and ecological production inside the nature conservation area are higher than those outside the same, and the supplying function has been stabilizing.

3.3 Update description on biodiversity involved in the provision of ecosystems services in the biosphere reserve (e.g. species or groups of species involved).

Over the past 10 years, the nature conservation area conducted a detailed general survey and verification on the families, categories and species of animals and plants inside the nature conservatin area together with dozens of institutions such as the Heilongjiang Academy of Sciences, Inner Mongolia University and Notheast Forestry University. And the census results show that, species or specie groups changed greatly in biodiversity in relation with the supply of ecosystem services.

Table 3-6 Statistic Table for Biodiversity

<table>
<thead>
<tr>
<th>Categories</th>
<th>Species</th>
<th>Number of species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants</td>
<td>Mycophyta</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Phycophyta</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Lichenes</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Bryophyta</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Pteridophyta</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Gymnospermae</td>
<td>7</td>
</tr>
</tbody>
</table>
Previously, there are a total of 143 families 428 categories 1044 species plants in all inside the protection area. Presently, the protection area and the Heilongjiang Academy of Sciences (referred to as “HAS” hereinafter) used advanced technologies to conduct a general survey and verification on plants inside the area. The general survey is being underway and is expected to finish by the year of 2015. Up to date, a total of 976 species of plants have been recognized and verified, among them, 36 are new discovered and documented. From this sense, the plant list has not been updated completely (Please see Appendix 9-5-1 for the recognized and verified plant list and see Appendix 9-5-2 for the list of the 36 newly discovered plant species). Previously, there are a total of 61 animal families 144 species, and presently, there are 89 animal families and 396 species of animals inside the area, 28 families and 252 species are newly discovered, mainly are birds. Among the newly discovered birds, four are First-Grade State Protection animals, i.e., Aquila chrysaetos, Grus leucogeranus, Ciconia boyciana and Ciconia nigra. In addition, there are 29 Second-Grade State Protection animals in all inside the same. (Please see Appendix 9-5-3 for the list of updated animals, and see Appendix 9-5-4 for the list of endangered animal species.

<table>
<thead>
<tr>
<th>Animals</th>
<th>Subtotals</th>
<th>Subtotals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angiospermae</td>
<td>948</td>
<td></td>
</tr>
<tr>
<td>Subtotals</td>
<td>1044</td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>Amphibian</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Reptiles</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Birds</td>
<td>255</td>
<td></td>
</tr>
<tr>
<td>Mammals</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>Subtotals</td>
<td>396</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3-1 Wild animals and plants
3.4 Specify whether any recent/updated ecosystem services assessment has been done for the biosphere reserve since its nomination/last report. If yes, please specify and indicate if and how this is being used in the management plan.

The Administration Committee of Wudalianchi Nature Protection Area has been conducting researches and evaluations on the ecosystems and ecological functions together with many research units and experts every year, and they have achieved important research results. For example, the article “Analysis on the Ecological Values of Wudalianchi in Heilongjiang” was published on the magazines “Biodiversity” in 2011. These research results have also been applied in relevant planning. For example, ecosystem evaluation results have been applied in land use planning and environmental impact assessments, so that planners may use the service values of the ecosystems as indicators to evaluate the rationality of land use planning to create a sustainable land use mode. Presently, there are a number of projects underway inside the Protection Area, such as the project titled “Ecological Service Values of the Forest inside the Protection Area” conducted by the Northeast Agricultural University.

4. THE CONSERVATION FUNCTION

[This refers to programmes that seek to protect biodiversity at landscape and site levels and/or ecological functions that provide ecosystem goods and services in the biosphere reserve. While actions to address this function might be focused on core area(s) and buffer zone(s), ecosystem dynamics occur across a range of spatial and temporal scales throughout the biosphere reserve and beyond.]

4.1 Significant changes (if any) in the main habitat types, ecosystems, species or varieties of traditional or economic importance identified for the biosphere reserve, including natural processes or events, main human impacts, and/or relevant management practices (since the last report).

Habitat types have not changed these years. There are mainly 7 habitat types inside the Protection Area. Formation of habitat types is closely related with the volcanic eruptions in the history. Type I: Forests mixed with conifers and broad leaf trees from cold temperature zones, and the character-species include larix gmelinii, korean spruce trees, poplar trees, birch
trees, oak trees, linden trees. Type II habitat types of volcanic rocks and rock plants, main plants include lichen and bryophyta plants, and the characteristic species include litmus, grimmia plagiopodia, gryoptens gragrans, pimus hinganensis, thymus mandschruicus and potentilla asperrima; Type III Aquatic habitat types and aquatic plants: characteristic species include: reed, cattail, water chestnut, buckbean, pondweed and spirogyra. Type IV Habitat type of lava plateau and bush meadow: characteristic species include: sorbaria, hazel, wild rose, garden burnet root, platycodon grandiflorum and Sieberian achnatherum sibiricum. Type V: Swamp habitant types and meadow, characteristic species include: deyeuxia angustifolia, sedge, ear lobe smartweed, pedicularis, marsh garigold and senecio; Type VI: meadow habitat types with forb meadow, characteristic species include: day lily, bush vetch, lily, Chinese peony and veronica spuria. Type VII: Forest habitat types, characteristic species include: larch, spruce, birch, poplar, willow herb, corylus mandshurica, adenophora stricta, trollius chinensis and deollingeria. As time goes by, rock decays and soil changes, vegetational types starts natural regeneration, and the ability of forest cover for natural regeneration improves, and the vegetation rate increases accordingly. Furthermore, removal of inhabitants had been living in the barrier lakes, lava plateaus and mineral water zones, land within the range of barrier lakes and lava plateaus being returned to forestry help to resume the natural ecosystems. As a result, quantities of environmental indicative plants such as litmum and thyme increase, habitants for animals have been properly preserved, animal species have increased, especially species and quantities of fish and birds increase greatly.

After 10 years of protection, structure and functions of ecosystems remain unchanged, and no significant changes have been seen in the varieties of plants and species with traditional or economic importance.
4.2 Describe the main conservation programs that have been conducted in the biosphere reserve over the past ten years as well as current on-going ones. Note their main goals and the scope of activities, e.g. biotic inventories, species-at-risk, landscape analyses, conservation stewardship actions. Cross reference to other sections below where appropriate.

Since joining the MBA Network, the Protection Area has got great support from Heilongjiang Province and the central government which make efforts to build the Wulianchi Nature Protection Area into a model among the biosphere reserves in the world and invest large amount of capital in the protection reserve project. The Protection Area has implemented a total of 48 different protection projects, and among them, major projects include the Protection of Surface Water Body nearby Volcano Dammed lakes, protection of geological relics, removal of residents previously lived in the core zone and the relief areas, and the electronic ecological monitoring system projects. During the past decade, the investment amounts to RMB768.04 million. (Please see the figure 4.2 below)
Protection measures for sustainable development include: 1. Policies and regulations: include state laws, local regulations and rules. 2. Ban on destruction of non-renewable resources. The development of tertiary industry helps to resolve local people’s living issues and effectively regenerate the renewable resources; and helps to achieve natural restoration of the vegetation. In addition, such bans also effectively reduces impacts of human activities on the ecological environments of the core and relief areas of the biosphere, achieve protection of the biology habitats and biodiversity. In the context of strict protection of resources inside the core and relief areas, try to reasonably develop and use resources of the transition areas, provide science popularization and education in core areas, so as to enable people to learn about the current situation of volcanoes and their course of changes. 3. Restoration and construction of the natural resources and ecology based on various measures such as closing hillsides for forest, returning farmland to forests or grassland or wetland, constructing fences, ecological demolition and immigration. From 2004, deforestation inside the Reserve has been completely prohibited, and hillsides have been closed for forestation, and has been implementing sustainable management measures and ecological public welfare forests protection programs. For example, the Reserve has successfully protected the sustainability of the nature based on the implementation of the restoration of nature projects, and a total of 12,800 acres of forest, grassland and wetland have been returned by implementing the returning farmland to forest project. 4. Measures to protect the natural resources and landscapes, such as: plank roads, fences and engineering projects; reducing interferences in areas impacted by human activities with effective measures, building protective paths of...
200,000 meters, protective fences of 11,000 meters and protective plank roads of 20,000 meters in major geological and ecological landscape areas, effectively preventing visitors and local residents from treading on biological and ecological as well as geological relics. Important volcanic landforms landscapes, springs, spring waters are all protected with fences and warning signs. 5. Natural resources protection and management mechanism. With a view to sustainable development of resources, we entirely promote comprehensive improvement of the environment by implementing long-term protection for resources. We also achieved ecological demolition for residents living in core zones, around dammed lakes, lava blocks and mineral water zones, their difficult living conditions have been greatly improved, and effectively eliminated the pollution on the environment of the Reserve from waste water, rubbish, pesticides and fertilizers generated from their living and production. Major measures we take include establishment of monitoring center, management stations, procurement of fixed patrol vehicles and mobile patrol vehicles, organization of fire protection force, joint supervision and inspection. In addition, environmental protection volunteers and environment supervisors all actively participate in the administration and protection of resources. Furthermore, we make greater efforts on the resource administration and fire prevention. No forest fires occurred in the past 10 years.

Figure 4-3 Ecological protection measures

The Reserve project enables protection of precious volcanic resources and biological diversities and play of its ecological functions, and it also drives the development mineral water processing industry, health care industries, tourism, mineral agricultural products bearable to the resources and environment, which creating jobs for local people, enabling stakeholders to benefit from the Reserve, achieved a sustainable ecological development that achieve development in protection, development benefit protection in turn. (Please see Appendix 9-7-1 for proteciton projects.)
4.3 In what ways are conservation activities linked to, or integrated with, sustainable development issues (e.g. stewardship for conservation on private lands used for other purposes)?

Over the past 10 years, the Reserve has taken a series of protective measures such as formulating scientific planning, improving protective facilities, promoting resource restoration, reasonable utilization of resources, and has successfully promoted the sustainable development of nature, economy and society for the Reserve.

Development of mineral water: By integrating mineral water enterprises, merging and closing small water producers with high energy consumption, the Reserve merge the former 23 mineral water enterprises into current 4. In addition, we control the mineral water production volume at an annual volume of 60,000 tons, far less than the flood volume (annual flood volume of silica mineral water greater than 20 million tons).

Aquaculture: the Reserve strictly implements fishing permit system, so as to control the fishing intensity, and it also strictly control the quantities of fishing boats and netting gears and size of fishing mesh, strict use of fishing gears. In closed fishing seasons, all fishing protection is prohibited, so as to protect fish to reproduce naturally.

Tourism: The Reserve has taken effective measures to reduce interferences inside areas impacted by human activities. In major geological and ecological landscape areas, a total of 200,000 meters of protective paths, 11,000 meters of protective fences, 20,000 meters of protective plank roads have been built. In addition, by means of spot and line tourism (visitors are only permitted to sightsee along the plank roads), we effectively prevent visitors and local residents from treading on biological, ecological and geological relics, restricting the number of visitors within the environmental capacity.

Ecological agriculture: By developing picking agriculture, sightseeing agriculture, adjusting structure of agriculture and planting, testing soil for formulated fertilization, use of pesticides with low poison and low residue, improve agricultural product quality, increase agricultural added values, the Reserve has successfully promoted the sustainable development.
4.4 How do you assess the effectiveness of actions or strategies applied? (Describe the methods, indicators used).

Over the past 10 years, a series of ecological protective measures taken by the Reserve have achieved significant results. Forest area and stand volume both increase significantly, forest structure and functions tend to be perfect, areas of grassland and wetland increase, environment indicative plants increase, kinds and numbers of birds both increase, habitats for animals improve, air quality achieves class I standard, water body achieves Type III functions (shown in figure 4-4). Moreover, local residents’ income increase, happiness index rises, people live in more harmony with the nature, local residents are more willing to get involved in the protection of the Reserve.

![Figure 4-4 COD curve of lakes inside the Reserve during wet and dry seasons for 2003-2012](image)

4.5 What are the main factors that influenced (positively or negatively) the successes of conservation efforts in the entire biosphere reserve? Given the experiences and lessons learned in the past ten years, what new strategies or approaches will be most effective for conservation for sustainable development?

Looking back at the history of the Reserve in the past 10 years, scientific concept of MAB, high importance attached and support offered by the state, province and municipality, active participation of local people, enterprises and public institutions and social organizations together with the scientific and rational planning helped to accelerate the protection and administration of the Reserve. However, there are some issues and problems with a few local residents and enterprises, such as excessive pursuit of interest, shortage in capital and
inadequate R&D force, which impacted the protection and administration of the Reserve adversely.

By looking back at the protection and administration of the Reserve in the past 10 years, we sum up a few experiences, including people first, planning first, joint involvement of all forces in the society, and adequate consideration of local people's fundamental interest. At the same time, there are some lessons we shall learn. In the past, mineral water enterprises started blindly to exploit mineral water disorderly only for pursuit of economic benefits.

In future, the Reserve shall further explore new approaches and new ideas for sustainable development, properly deal with the relation of protection and development, human and the nature, attempting to achieve balance between protection and development.

4.6 Other comments/observations from a biosphere reserve perspective.

In the past 10 years since its joining the world biosphere, the Reserve has achieved positive results in resource protection and infrastructure construction. These results cannot have been achieved without its join in the world biosphere reserve network, the concept of the human and biosphere helped guide the transition from traditional absolute protection to open and multipurpose positive protection, which effectively protected the successive environment of volcano vegetation and mineral water resources, enable the Reserve to increase its influence and attract an increasing number of visitors and science enthusiasts and mineral spring tourism achieve a good development. As a result, annual net income of urban and rural residents keeps increasing, and the human world develops in harmony with the nature.

5. THE DEVELOPMENT FUNCTION

[This refers to programs that address sustainability issues at the individual livelihood and community levels, including economic trends in different sectors that drive the need to innovate and/or adapt, the main adaptive strategies being implemented within the biosphere reserve, and initiatives to develop certain sectors such as tourism to complement and/or compensate for losses in other markets, employment, and community well-being over the past ten years]
5.1 Briefly describe the prevailing trends over the past decade in each main sector of the economic base of the biosphere reserve (e.g. agriculture and forest activities, renewable resources, non-renewable resources, manufacturing and construction, tourism and other service industries).

Since its joining the world biosphere reserve, by implementing a series of protective measures and positive guiding policies, changing development concept, the ecological environment has been gradually restored. Based on the ecological environment development, four sustainable industries- feature agriculture, mineral water processing, health care and tourism have become leading industries for the Reserve. Over the past 10 years, without prejudice to the resources and environment, the Reserve has been actively exploring new mode of economic development, seeking new economic growth. In addition, in consideration of ecological protection and restoration, the Reserve has been making efforts to adjust economic structure, constantly strengthening ecological feature agriculture, mineral spring industry and tourism as well as other advantageous industries. Agriculture has shifted from traditional planting agriculture to ecological and sightseeing agriculture, forest has achieved shift from production forest focusing on deforestation to ecological forest that protect forest resources fully. Non-renewable volcanic lava, volcanic ash and mineral slurry resources have shifted from exploration to full protection. Tourism has also shifted from extensive tourism to science and ecological tourism. Due to more effective resource protection from industrial structure adjustment, advantageous industries achieved development, and also driven the development of emerging industries such as tourism services and processing of mineral products (mineral liquor, mineral beer, mineral soybean mild and mineral agricultural products as well as mineral fishing products.
Figure 5-1 Mineral water processing

Over the past 10 years, the Reserve’s economy keeps growing, resource allocation is more rational and optimized. Industrial development increase local people’s income, achieved efficient protection of resources. The Reserve deals well with the relationships of the ecological environment, economic development and residents’ welfare. The Reserve’s GDP grew from RMB 90.88 million in 2003 to RMB 415.54 million in 2012. Urban residents’ income increased from RMB4,420 in 2003 to RMB 15,468 in 2012. Farmers’ income also grew from RMB1,560 in 2003 to RMB 7,130 in 2012.

5.2 Describe the tourism industry in the biosphere reserve. Has tourism increased or decreased since nomination or the last periodic review? What new projects or initiatives have been undertaken? What types of tourism activities? What effect have these activities had on the economy, ecology and society of the biosphere reserve? Are there any studies that examine whether designation of the area as a biosphere reserve has influenced the number of tourists? Please provide the bibliographic information of any studies and/or a paper copy in an annex.

Sustainable development of tourism is of great significance for the development of the Reserve, income from tourism tops all businesses for the Reserve. In the context of rational distribution of visitors, a total of 125 visitors were received by all scenic spots in 2012.
(environmental capacity of 1.48 million visitors), contributing a total of RMB 37 million by admission tickets and a total of tourist income of RMB 263 million, 6.5 time, 19.5 time and 23.8 time that when the Reserve was originally approved respectively. Visitors were from all provinces and cities across China, and the Reserve also attracted foreign visitors from more than 30 countries such as Russia, South Korea, Japan, Southeast Asia, USA and Europe. During 2003-2013, the Reserve achieved an annual growth of 17.8% in terms of visitors, annual growth of 16.6% in terms of admission tickets, and 21.5% in total tourist income.

The Reserve is a precious relic left for the human by the quaternary volcanic action. With beautiful mountains, peaceful waters, magic springs, fantastic stones and strange caves, the Reserve is a general purposed comprehensive international tourist destination with high oxygen content suitable for ecological tourism, leisure vacation, health care treatment and scientific investigation.
In the landscape with a total area of 1,060 km², there are 14 new and old volcanos, which erupted in different ages, ranging from 200 years prehistory to 290 years ago, which form a top tourist resource in the world. The reserve has the well preserved, highly concentrated and typical new and old volcanic geologies. 14 high-rising volcanic cones create a magic senery by complementing with mountains and rivers. In addition, there are various micro landscapes such as rock dragons, rock seas, lava cascades, lava blind pass, lava stalatites, lava swirls, lava elephant noses, lava flowers, jet cone discs, volcanic pisolites and volcanic bombs. As a result, the Reserve is called as “Natural Volcanic Museum” and an “Open Textbook on Volcano”. Inside the Reserve, there are five linked lakes seeming like a serie of pearls, which are formed by last volcanic lava fill the vast remote ancient basin lake- the Wudelinchin Lake, and the Wudalianchi was also known for these five lakes. Wudalianchi lake is the second largest dammed lake in China, and its lake bank changes complexly, creating a very beautiful scene. In addition, it is rich in ferrous and silicon as well as Ca-Mg bicarbonate-type mineral water, which are appraised as “magic spring” and “holy water”, and is admired as “top three cold springs in the world” together with the Vichy spring in France and the Narzan mineral spring in Russia. Moreover, over the past 1000 years, it has been used as medicine, drinking water and in care, having magic effect for restoration, health care and human being’s life.

![Figure 5-4 Mineral water suitable for drinking and bath](image)

Infrastructures in the Reserve improved. 1. Black Dragon Hill: this scenery is the most typical scenery being well preserved. In order to enable visitors to appreciate, paths extending from the west entrance of Black Dragon Hill to the small parking lot and from the small parking lot to Firing Hill have been re-paved. The boardwalk from the small parking lot to the peak has also been paved. In addition, the Black Dragon Hill has introduced environmental
sightseeing bus, changing the condition that private cars may enter directly, not only reducing pollution exhaust from vehicles, but also reduced visitors to treading on the scenery, properly protecting the environment. Moreover, a sightseeing plank road has been built, providing conveniences for visitors to appreciate scenery in the Reserve, but also eliminating destruction to landscape by reducing visitors’ treads. 2. South Drinking Spring. Outdoor bathing pools have been renovated with higher sightseeing values and applicability. In addition, swimming pools are added in this scenery, providing recreation facilities for visitors. 3. North Drinking spring: the gallery has been removed, and a new drinking area has been constructed for purpose of easing visitors to collect water. In addition, the total environment has also been improved. 4. Longmen Rock Village is a landscape developed and constructed in 2006 with a huge investment from the government. The entire scenery is connected by plank roads, enabling people to appreciate the grand sight of the rock seas and the magic fabricates of the nature. 5. Wenbo: Wenbo scenery is a landscape completed in 2004, it operates while being constructed. From a privately operated scenery, the government purchased it. At presently, visitors may visit this scenery by both road and water. In addition, the scenery pave sightseeing plank roads and purchased quite a few environment pleasure-boats for visitors to view sceneries. With complete infrastructures, the Wenbo is shaped scenery with a high appreciation value. 3. Sanchi Water Tourism Spot: was developed as a scenery spot in 2004. Visitors may take pleasure-boats to view beauties of dammed lakes.

Infrastructures and service facilities for tourism have been further improved. In 2003, the accommodation conditions for tourists inside the Reserve was still poor in 2003. At that time, there was no hotels in it, and there were only low-end vest homes with poor service facilities.
Other accommodation facilities include small inns, and there were only more than 10 snack counters, 1 travel agency and a few guides, and tricycles are then main transports. After 10 years of development, small inns and hotels improved their facilities and grades, upgraded as hotels and starred. Currently, there are more than 60 hotels inside the Reserve, among which, there are 3 four-star hotels, 12 three-star hotels, and a few five-star hotels are under construction in famous tourist towns inside the Reserve, and hotel staff exceed 3000. In consideration of different demands from visitors, there are more than family hotels inside the Reserve, and local residents also develop and design vest homes and rental estates also operate. The reserve pays special attention to the development of specialty catering products. At present, Lianchi Fish, Mineral Eggs, Mineral Bea Curd and local food are well known far and wide. There are 75 restaurants inside the Reserve, employees hired by these restaurants have also increased to more than 1,000 people. Moreover, more than 200 national guides have been well trained and there are more than 200 taxes running on roads already.

Tourist transportation facilities have also improved further, and transportation in and outside the Reserve is more convenient. In 2003, it took people 7-8 hours to leave the Reserve to Harbin by vehicle. Presently, Qian-nen Express has greatly shortened the distance from the Reserve to Harbin, it takes only 3-4 hours. In addition, it takes only about 4 hours from the Reserve to Heihe and Yichun City, enabling tourists to travel conveniently, and there are also more tourist routes for tourists to choose from. In addition, all long-distance buses have been changed to new air-conditioned buses, providing better services for visitors to travel. Operation of public buses and shuttle buses to and from different scenery spots inside the Reserve provides convenience for tourists and local people to travel. Dirt roads have been changed to cement roads for the main roads and lanes inside the Reserve.

![Figure 5-6 Reception hotels](image1.jpg) ![Figure 5-7 Environmental electro mobiles](image2.jpg)
Tourism is an import industry for the economic development of the Reserve. Assessment on social, economic and ecological impacts show that, tourism enables local residents to change their production and lifestyles dependent on the nature, which may create more jobs for local residents, increase their benefits, and improve their awareness of environment protection. It may also be helpful to publicize ecological tourism knowledge, enable them to actively participate in environment protection, so as to strengthen ecological environment protection and achieve sustainable development of tourism.

Please refer to the Appendix 9-6 Updated List of References on Wudalianchi World Biosphere Reserve for relevant studies on tourism in Wudalianchi Reserve.

5.3 When applicable, describe other key sectors and uses such as agriculture, fishing, forestry. Have they increased or decreased since the nomination or the last periodic review? What kind of new projects or initiatives have been undertaken? What effect have they had on the economy and ecology of the biosphere reserve, and on its biodiversity? Are there any studies that examine whether designation as a biosphere reserve has influenced the frequency of its activities? If so, provide the bibliographic information of these studies and/or a paper copy in an annex.

Over the past 10 years, land area for agriculture decreased, for forest increased, and land area for fishing kept basically balanced. On the principle of “low carbon, being green, ecological and environmental”, agriculture, forestry and fishing of the Reserve have been repositioned in consideration of new functions. Agriculture focuses on planting structural adjustment, traditional bean and wheat planting have changed to high value-added and tourism agriculture, use of low poison and low residual pestices, and testing soil for formulated fertilization are encouraged. The Reserve has been entirely recognized as a pollution-free area for agricultural products, and Wuyuan branded bean has been recognized as green food, and a total of 120,000 acres of land is used to produce Wuyuan bean. In addition, mineral bean curd, mineral eggs and mineral rice have gradually become local specialty brands, sell well both in and outside Heilongjiang Province, and are also welcomed by consumers. Additionally, the Reserve makes great efforts to develop tourist agriculture in relation with tourism. At present, there are 3 ecological picking parks which plant grapes, watermelons and cassabas as well as...
other green and organic agricultural products for tourists to pick in the field. The reserve also develops sightseeing agriculture, planting marigold, silibinin and blueberry for tourists to appreciate. It also introduces agricultural experience tour, enable tourists to learn about agricultural knowledge and experience agricultural production by participating in the agricultural production.

Major changes of forestry is the shift in its industrial function, forestry has changed from production to ecological forestry, and forest area has increased greatly. (figure 5-5). Over the past 10 years, a total of 8,827 acres of land has been forested, 49,329 acres of forest has been replanted, a total of 22,685 acres of farmland has been closed for forestation, grassland and wetland. By closing hillsides for forestation, forest resources enriches, and animal habitats have been preserved effectively, wildlife corridors have been improved, and the ecological functions of forest have been strengthened and are more prominent. With the construction of 18 resource management stations in the Reserve, responsibilities for forest resource administration have been allocated to hills and land plots and to persons. Roles of forest workers also changed from previous timber producers to forest resources caregivers, and forest management is grid-enabled in terms of resources.

Changes in forest land inside Wudalianchi Reserve during 2003-2012

![](image)

Figure 5-5 Bar graph for changes in forest land during 2003-2012

The above figure shows that, during the 10 years, forest land increased by 3,516 acres in all, from 26,787 acres in 2003 to 30,303 acres in 2012, and the forest coverage rate increased from 25.3% when the Reserve was established to today’s 28.6%. With the increase in forest
land, much forest lawn becomes forest land naturally, and vegetation types of forest resource communities enriched, animal habitat corridors have been further improved, and animal species and quantities increase accordingly.

There is no significant changes in fishing, which remained balanced basically. Mineral spring carps, grass carps, crudian craps, chubs and bighead fish rich in volcanic dammed lakes have all been recognized as geographical indication of agricultural products by the state. By implementing a rational off season for sustainable development of fishing economy, the fishing industry achieved a sustainable economic development with good ecological resource protection.

Please refer to Appendix 9-6 “Updated List of References on Wudalianchi World Biosphere Reserve for relevant studies on agriculture, fishing and forestry in Wudalianchi Reserve.

5.4 How do economic activities in the biosphere benefit local communities?

Since its establishment, the Administration Committee of Wudalianchi Reserve has taken a series of measures to stimulate local economy, and the tourism, health care, mineral water processing and green agriculture all have achieved rapid development. From this sense, the Reserve plays an important role in leading the local economic development, encouraging local people to get rich, creating jobs for labors. The Administration Committee of the Reserve encourages, directs and supports local residents to engage in individual operation, entering tourist guide, tax, hotels, catering services, specialty green food product processing, tourism souvenir development, having successfully resolved the problem of labor employment. As a result, residents’ income increase rapidly, and they have been living a richer life now. Jobs are more than labors in the Reserve, people may find jobs suitable for themselves if they are willing and capable to work. Since 2003, community residents' income has been increasing year by year, farmers find an increasing number of channels to earn income. From local communities to villages, resident get benefits and have many potential benefits, as a result, the economic base tends to be increasingly stable and diverse. At present, the per capita revenue and per capita income of the Reserve is significantly higher than that of areas nearby. In 2012, per capita income of urban and rural residents inside the Reserve achieved RMB 15,468 and
RMB7,130 respectively, being 3.5 times and 4.6 times of 2003, growing at an annual rate of 16% and 18% respectively.

5.5 How do you assess the effectiveness of actions or strategies applied? (Describe the methods, indicators).

From 2003 to 2013, GDP, fiscal budget, annual per capita net income of farmers, annual per capita net income of urban residents increase year by year (Table) (See Table 5-1 below). Investigation by distributing questionnaire (Figure 5-9 in the right) to residents showed that, resident happiness index has also been improving year by year. All strategic choices of the Reserve are all helpful to improve lives of community residents, economic development, social advancement and protection of ecological environment. In the past 10 years, the Reserve successfully explored a Wudalianchi mode that may not only protect natural resources, cultural resources, but also may promote the sustainable social and economic development.

Table 5-1 Statistics on economic development of Wudalianchi Reserve during 2003-2012

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP (RMB 10T)</th>
<th>Fiscal budget (RMB 10T)</th>
<th>Per capita net income of farmers (RMB)</th>
<th>Per capita net income of urban residents (RMB)</th>
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5.6 Community economic development initiatives. What programmes exist to promote comprehensive strategies for economic innovation, change, and adaptation within the biosphere reserve, and to what extent are they implemented?

Since it joining the world biosphere network, Wudalianchi world biosphere has always been aiming to promote development with a harmony between the human and the nature and...
achieve sustainable development, has been adhering to benefit people by protection, enable people to get rich and feel happy with development, improving local people’s satisfaction and sense of happiness.

Development of volcanic ecological tourism, mineral spring health care, mineral water and cultural industries enables Wudalianchi Reserve to follow a path for green and low carbon sustainable development, leading nearby residents to transform and get jobs so that they have been increasing income constantly. Development of tourism attracted local residents’ participation, increased their income and improved their benefits. Development of mineral spring health care even attracts tourists from Russia. With mineral spring resources for health care, various industries develop well and also benefit community residents. Protective development of mineral water further enhanced the influences of Wudalianchi brand, also improved the competitiveness of Wudalianchi mineral water. Development of cultural industry promoted the protection of diverse cultures and helped the formation of holy water culture.

5.7 Local business or other economic development initiatives. Are there specific “green” alternatives being undertaken to address sustainability issues? What relationships (if any) are there among these different activities?

By taking mineral water industry as the leading industry, the Reserve has created five industrial cluster with mineral water in Wudalianchi. Based on the concept of scaled and intensive development, the Reserve has constructed the “World Class Mineral Water Production Base”. There are 4 mineral water producers inside the Reserve, and mineral water brands such as Quanshan, Wudalianchi, Xianchi and Jianlong have obtained organic certification, and these enterprises develop well, creating jobs for local residents. Farmland inside the entire Reserve has been recognized as pollution-free area for agricultural products, and the Wuyuan branded bean is recognized as green food which is produced in a land of 120,000 acres. By extending the industrial chain of mineral water, the Reserve encourages to develop mineral water liquor, mineral water cosmetics, mineral water bean products as well as other series products. In addition, the Reserve develops ecological agricultural picking parks, specialty livestock feeding plants nearby mineral springs, mineral spring fish and aquatic
production area, plant bean and rice with mineral water, and other featuring local sightseeing agricultural products such as grapes, watermelon and sweat mellows. Fish species such as carps, grass carps, crucians and big head fish have obtained certification of geographical indication of agricultural products. In Sep. 2004, the China World Biosphere Reserve-Green and Organic Product Trade Show was held in Wudalianchi. Mineral spring livestock, fish, eggs and wild vegetables have become specialty food essential for meals offered to tourists. These measures not only achieved good economic effects, but also drive local residents to get rich.

5.8 Describe the main changes (if there are any) in terms of cultural values (religious, historical, political, social, and ethnological) and others, if possible with distinction between material and intangible heritage. (c.f. UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage 1972 and UNESCO Convention for the Safeguard of the Intangible Cultural Heritage 2003 (http://portal.unesco.org/en/ev.php-URL_ID=13055&URL_DO=DO_TOPIC&URL_SECTION=201.html and http://portal.unesco.org/en/ev.php-URL_ID=17716&URL_DO=DO_TOPIC&URL_SEC
In the history, ancestors of Daur, Oroqen, Ewenki, Mongols, Manchu and Han people inhabited in Wudalianchi regions because they yearned for the spirits of mountains and rivers there. They drank and bath with these magic springs, lived and bred here, making Wudalianchi a famous Holy Land for people to worship holy water. In Holy Water culture, the « Wudalianchi Holy Water Festival » representing minority culture in North China is one of the top 100 folk festivals in China, also a grand festival for people from different nationalities to gather. Since 2003, the Reserve has successfully held 10 holy water festivals, which tens of folk activities were on show at the festivals, including holy water sacrifice, campfire carnival, folk singing and dancing, blessing by print black, latern show in mineral springs, competing for holy water at midnight, temple fair, outing in parks, dragon boat race, removing illness by throwing stones and drinking before hunting with bow and arrows.

Culture of educated young people. After the liberation of Northeast China in 1948, Liang Jun, the first female tractor driver was known in Wudalianchi region. During the period when urban young people being sent to the countryside, tens of thousand of educated young people from all over the Country left their youth and memories in Wudalianchi. Religious culture. At the Yaoquan Crater, there is the only temple at crater in the world- it is the Zhonglin Temple, which makes this place a buddhist holy land being famous both nearby and in remote regions, and pilgrims from different places flow to worship here endlessly.

Cultures inside the Reserve have been inherited and carried forward by local people from different nationalities. Good preservation of the ecological environment of Wudalianchi region is closely linked with their self-awareness of protection. Culture connotation of the Reserve is of great importance for different nationalities in the regions, and will play an immeasurable important role for the study on traditional religious cultures in minority regions,
their origins and national cohesion generated by religion, great national unioni, social prosperity and progress as well as the ecological and environmental protection of the nature.

The Reserve is a state natural relic for China, and holy water festival is also a kind of intangible cultural heritage.

![Figure 5-11 Holy water culture in the Reserve](image)

![Figure 5-12 Religious culture in the Reserve](image)

5.9 Community support facilities and services. What programmes in/for the biosphere reserve address issues such as job preparation and skills training, health and social services, and social justice questions. What are the relationships among them and with community economic development?

Fast economic development needs a large number of skilled employees. The Reserve has always been considering labor skill training as an important means to create job and increase income for local residents. Every year, the Labor Bureau organizes “Re-Employment Training Programs for Laid-off Workers”, the Agricultural Committee organizes a few “Labor Transfer Training” each year, the Tourism Bureau organizes “Tourist, hotel, catering services and
guide trainings“, and the Legislative Affairs Bureau organizes “Legislation Training”. All these institutions may offer trainings for about 3,000 people each year. These training courses improve labor’s qualities and skills, helping them to get a job. In addition, “New rural cooperative medical care program” and “Resident Medical Care Insurance” enable all people inside the Reserve to see doctors in case of sickness. In addition, the Reserve has improved the aiding system for difficult group with low income, providing living allowances for those have no kids and cannot support themselves, ensuring their living quality. Labors inside the Reserve have equal employment opportunities and have equal rights to participate in social management.

5.10 What indicators are in place to assess the effectiveness of activities aiming to foster sustainable development? What have these indicators shown?

Development of tourism, health care, mineral water, ecological and sightseeing agriculture, fishing and cultural industries of the Reserve promoted the sustainable economic and social development of the Biosphere Reserve, creating jobs for local residents, enable them to change their life style from resource dependence to resource protection. As a result, air quality improved significantly, days with a good air index are more than 310 days. Mineral water is developed in consideration of the spillover, and the extraction volume is restricted within the range bearable to the natural resources (spring flood volume is about 20 million tons), promoting sustainable development of mineral water industry. Protection of ecological public welfare forest helped the shift in the production mode of forest workers from deforestation to protection of forest resources, effectively protecting habitats, increasing the total area and stand volume of forest resources, achieving a forest coverage rate of 28.6%. As for agricultural development, we testing soil for formulated fertilizatoin to protect soil resources and safeguard basic resources for the sustainable development of agriculture. As for fishing, implementation of fishing off effectively protects the sustainability of natural fishing resources and safeguards the sustainable development of fishing resources.

Over the past 10 years, the Administration Committee has been adhering a concept of human and biosphere, adjusting industrial structure and development modes, respecting the
nature and developing rationally, finding a sustainable path with coordinated development of the nature, economy, society and culture.

5.11 What are the main factors that influenced (positively or negatively) the success of development efforts in the entire biosphere reserves? Given the experiences and lessons learned in the past ten years, what new strategies or approaches will be most effective?

In the 10 years of history of the Reserve, driven by fast economic development of China, rich natural resources of the Reserve, wide leadership and careful organization of the Administration Committee of Wudalianchi Reserve, hard work and wisdom of local residents and enterprises in the Reserve, assistance and support from research institutions and universities, all contribute greatly to the development of the Reserve.

Looking back the history of the development in the past 10 years, we have learnt many experiences beneficial for the development of the Reserve. Economic development demands a scientific and reasonable planning. In addition, it also needs local resource advantages, reasonable choices of industrial development, adjustment in industrial structure, development of feature industries which are helpful for the play of main ecological functions and bearable for the resources and environment of the Reserve, restrictions on the development of industries that are not consistent with the protection of main ecological functions. Economic development will also require us to play and motivate local residents and enterprises to participate in the development of the Reserve. At the same time, we have also learnt some lessons. For example, the Reserve relies heavily and use excessive natural resources for its economic development. In addition, its economic development mode is not insufficient innovative. We also have not achieved depth in resource utilization. As a major agricultural product inside the Reserve, bean is still sold after being harvested. No deep and fine processing for the bean, therefore, added value has not been improved for the bean.

We shall further explore how to best use mineral water in a comprehensive matter, develop its utilization in more fields, such as mineral water liquor, mineral water bean products. As for tourism, we shall accelerate the development of tourist souvenirs, provide more items interactive with visitors. As for agriculture, we shall shift toward picking
agriculture, ecological agriculture and sightseeing agriculture. We shall also make efforts to educate the development of cultural industries such as holy water culture.

6. THE LOGISTIC FUNCTION:

[This refers to programs that enhance the capacity of people and organizations in the biosphere reserve to address both conservation and development issues for sustainable development as well as research, monitoring, demonstration projects and education needed to deal with the specific context and conditions of the biosphere reserve.

6.1 Describe the main institutions conducting research or monitoring in the biosphere reserve, and their programmes. Comment on organizational changes (if any) in these institutions over the past ten years as they relate to their work in the biosphere reserve.

The reserve has established three research institutions, i.e. Wudalianchi Earthquake and Volcano Monitoring Station, Institute of Volcanoes and Mineral Springs in Heilongjiang Academy of Sciences, and Heilongjiang Wudalianchi Environmental Monitoring Station (see Figure 6-1), to conduct regular monitoring on Wudalianchi volcanic earthquakes, mineral water, surface water and atmosphere. See Table 6-1 and 6-2.

Figure 6-1 Research and Monitoring Institutions in the Reserve
Table 6-1 Statistics on Basic Information of Monitoring and Research in Wudalianchi World Biosphere Reserve

<table>
<thead>
<tr>
<th>Unit Name</th>
<th>Category</th>
<th>Main Instrument Model</th>
<th>Qty</th>
<th>Frequency</th>
<th>Departments</th>
<th>Staffing</th>
<th>Area (m2)</th>
<th>Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
<td>Water quality monitoring</td>
<td>Ion chromatography PIC-10A</td>
<td>1</td>
<td></td>
<td>Mineral Research Laboratory, Volcanic Geology Laboratory, Ecological and Environmental Laboratory, Resource Utilization Laboratory and Mineral Water Product Quality Testing Laboratory</td>
<td>A total of 20 people, including a senior engineer treated as researcher, 2 senior engineers, 1 senior experimentalist, 8 engineers and assistant researchers and several researchers in relevant disciplines</td>
<td>8000</td>
<td>3500</td>
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<tr>
<td></td>
<td></td>
<td>Atomic absorption spectrophotometer TAS990</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td>Spectrophotometer UV-754</td>
<td>2</td>
<td>4 monitoring sections of surface water and groundwater, once a month</td>
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<td></td>
<td></td>
<td>Eurotronic ultra-pure water machine UPT-I-10T</td>
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<td>Chemical oxygen demand tester COD-571</td>
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<td></td>
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<td>Scattered light turbidity meter WGZ-3A</td>
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<td></td>
<td></td>
<td>Colorimeter SD-9012</td>
<td>2</td>
<td></td>
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<td></td>
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<td>Biochemical incubator SPX-150B-Z</td>
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<td>Single-man single-sided clean bench SW-CJ-1FD</td>
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<td></td>
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<td>Electrothermal blowing dry box 101-2</td>
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<td></td>
<td></td>
<td>Intelligent cold atomic fluorescence mercury analyzer ZYG-II</td>
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<td></td>
<td></td>
<td>Low background αβ meter BH1216 II</td>
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<td></td>
<td></td>
<td>Indoor radon thorium analyzer FD125</td>
<td>1</td>
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<tr>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
<td>Water quality atmosphere waste water noise monitoring</td>
<td>Sartorius electronic balance BS124S</td>
<td>2</td>
<td>24-hour atmospheric monitoring Point 1</td>
<td>Office Biology Laboratory Water Quality Laboratory Atmosphere Laboratory</td>
<td>A total of 11 people, including a senior engineer, 8 engineers, an assistant engineers</td>
<td>8800</td>
<td>1000</td>
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<td></td>
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<td>PH meter PB-10</td>
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<td>Monthly monitoring of surface water Section 1</td>
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<td>721E visible light photometer 721E</td>
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<td>Atomic absorber TAS-986G</td>
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<td>Incubator SP-250A</td>
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<td>Oil content analyzer ZDS-106U +</td>
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<td>Mercury analyzer WCG-208</td>
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<td>UV-1800 spectrophotometer UV-1800</td>
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<td>T-6 Xin Yue spectrophotometer NHT-6</td>
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<tr>
<td></td>
<td></td>
<td>Real-time signal analyzer</td>
<td>2</td>
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</tr>
<tr>
<td>Wudalianchi Volcanic Earthquake Monitoring Station</td>
<td>Research</td>
<td>CTS-1E seismometer</td>
<td>EDAS-24 data logger</td>
<td>Network transmission equipment</td>
<td>BBVS-60</td>
<td>EDAS24IP</td>
<td>Real-time monitoring</td>
<td>Seismic fluid laboratory, volcanic network</td>
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<tr>
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<tr>
<td>AWS6291</td>
<td>Analysis Laboratory</td>
<td>TSP sampler Laoting 2030</td>
<td>4</td>
<td>Air sampler 2020 Laoting 2020</td>
<td>2</td>
<td>Drying oven 101</td>
<td>2</td>
<td>Autoclave LDZM-60KCS</td>
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</table>

Table 6-2 Statistical Table on Research Results of Institutes in Wudalianchi World Biosphere Reserve

<table>
<thead>
<tr>
<th>Year</th>
<th>Research Result</th>
<th>Research Institute</th>
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<tbody>
<tr>
<td>2003</td>
<td>Study on water treatment technology of Wudalianchi metasilicate mineral water</td>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
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<tr>
<td>2003</td>
<td>Brief Introduction on relationship between shallow gas thorium, radon and faults and volcanic activity in Wudalianchi volcanic area</td>
<td>Wudalianchi Volcanic Earthquake Monitoring Station</td>
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<tr>
<td>2003</td>
<td>Yaoquan Lake Eutrophication trend and its Improvement Measures</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
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<tr>
<td>2004</td>
<td>Study on Wudalianchi volcanic region geothermal display and development Prospect</td>
<td>Wudalianchi Volcanic Earthquake Monitoring Station</td>
</tr>
<tr>
<td>2005</td>
<td>Study on fluid geochemistry of Wudalianchi volcanic area</td>
<td>Wudalianchi Volcanic Earthquake Monitoring Station</td>
</tr>
<tr>
<td>2007</td>
<td>Determination of iron content in Wudalianchi mineral water by spectrophotometry</td>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
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<tr>
<td>2007</td>
<td>Measurement and Analysis of mineral water in source of Wudalianchi</td>
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<tr>
<td>2007</td>
<td>Determination and Analysis of Trace Elements in Wudalianchi slimes</td>
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<td>2008</td>
<td>Survey on mineral water resources in Wudalianchi Scenic Area</td>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
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<tr>
<td>2008</td>
<td>Quality problems and quality control in Wudalianchi bottled mineral water production</td>
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<tr>
<td>2008</td>
<td>Wudalianchi Erlongquan mineral water treatment processes and research</td>
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<td>2008</td>
<td>Wudalianchi outcrop spring escaping gas helium isotope assay and volcanic activity investigation</td>
<td>Wudalianchi Volcanic Earthquake Monitoring Station</td>
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<tr>
<td>Year</td>
<td>Research Topic</td>
<td>Institution</td>
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<tr>
<td>2009</td>
<td>Sustainable use model and its digitization of Wudalianchi natural mineral water</td>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
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<tr>
<td></td>
<td>Study on algae and sediment control in Wudalianchi Erlongquan mineral water</td>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
</tr>
<tr>
<td></td>
<td>Study on characteristics of organic pollutants in Wudalianchi Barrier Lake</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
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<tr>
<td></td>
<td>Study on Wudalianchi Yaoquan Lake Water Quality</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
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<td></td>
<td>Primary Investigation on Relationship between the total number of bacteria in Wudalianchi and the physical and chemical indicators</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
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<tr>
<td>2010</td>
<td>Wudalianchi mineral water and its medical value</td>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
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<td></td>
<td>Development of Wudalianchi natural mineral celery juice beverage</td>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
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<td></td>
<td>Development of Wudalianchi Momordica Grosvenori mineral beverage</td>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
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<tr>
<td></td>
<td>Development of Wudalianchi metasilicate mineral Kudzuvine Root mineral</td>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
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<td></td>
<td>Distribution of phosphorus in water of Wudalianchi in Winter</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
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<td>Preliminary Study on Polycyclic Aromatic Hydrocarbons in Northeast China Rural Area</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
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<td>Preliminary Study on Nitrogen distribution and law in water of Wudalianchi</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
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<td>2011</td>
<td>Study on divalent iron ions stabilization method in Wudalianchi bicarbonate mineral water</td>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
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<td>Investigation of Wudalianchi natural mineral water source microbial contamination</td>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
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<td></td>
<td>Wudalianchi natural mineral water nickel element content and exploration</td>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
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<tr>
<td></td>
<td>Development of Wudalianchi mineral nutrition beverage</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
</tr>
<tr>
<td></td>
<td>Research on Wudalianchi Erlongyan Spring Water Dynamic Variation</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
</tr>
<tr>
<td></td>
<td>Development of Wudalianchi volcanic mineral mud Handmade Soap</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
</tr>
<tr>
<td></td>
<td>Study on Nitrogen and Phosphorus Pollution to natural outcrop springs near farmlands in Wudalianchi scenic area</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
</tr>
<tr>
<td></td>
<td>Wudalianchi Natural Mineral Ecological Environment Evaluation</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
</tr>
<tr>
<td></td>
<td>Study on the quality control in the soft drink production process</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
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<td></td>
<td>Health risk assessment on Mn, Ni ions in Wudalianchi bicarbonate mineral water</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
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<td>Wudalianchi Yaochuanhu Lake heavy metal pollution characteristics and Ecological Risk Assessment</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
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<td>Development of Wudalianchi Pueraria mineral water drinks</td>
<td>Heilongjiang Wudalianchi Environmental Monitoring Station</td>
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<td>Wudalianchi Atmospheric PAHs Pollution Characteristics</td>
<td>Heilongjiang Wudalianchi Monitoring Station</td>
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<td>Wudalianchi atmospheric PAHs pollution source analysis and control measures</td>
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<tr>
<td></td>
<td>Study on Wudalianchi volcanic seismic monitoring station surface wave magnitude deviation</td>
<td>Wudalianchi Volcanic Earthquake Monitoring Station</td>
</tr>
<tr>
<td></td>
<td>Analysis on Wudalianchi Fluid Abnormity before/after 9 magnitude earthquake in Japan</td>
<td>Wudalianchi Volcanic Earthquake Monitoring Station</td>
</tr>
</tbody>
</table>
6.2 Summarize the main themes of research and monitoring undertaken over the past ten years and the area(s) in which they were undertaken in order to address specific questions related to biosphere reserve management and for the implementation of the management plan (please refer to variables in Annex I).

(For each specific topic provide reference citations. Provide the full citations alphabetically by lead author at the end of Section 6 or in a separate annex).

The reserve has actively carried out scientific research with CAS Institute of Botany, Academy of Sciences of Heilongjiang Province, Heilongjiang Institute of Nature and Ecology, Ministry of Environmental Protection Nanjing Institute of Environmental Protection, China International Engineering Consulting Corporation, Zhejiang Institute of Geological Survey, Heilongjiang Geological and Hydrological Institute, China Fisheries Research Institute of Heilongjiang Academy of Agricultural Sciences, China University of Geosciences, Capital Normal University, Inner Mongolia University, Tsinghua University, Jilin University, Northeast Forestry University, Northeast Agricultural University, Shenyang Ligong University, Qiqihar University, Heihe College, Northeast Normal University, Heilongjiang University, Heilongjiang TCM Hospital Field Teaching and Research Base. See Table 6-3.

<table>
<thead>
<tr>
<th>Year</th>
<th>Research area (refer to variables in Appendix 9-7-5)</th>
<th>Research Institute</th>
<th>Research Area</th>
<th>Publication</th>
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<tr>
<td>2003</td>
<td>Soil</td>
<td>Jilin University-School of Resources and Environmental Sciences</td>
<td>All area</td>
<td>PZC Characteristics of Volcanic Ash Soils in Changbaishan and Wudalianchi</td>
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<td></td>
<td>Contaminants Groundwater</td>
<td>Heilongjiang Hydrogeology and Engineering Geology Team</td>
<td>Transition zone</td>
<td>Wudalianchi Mineral Water Characteristics and Development Protection Measures</td>
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<td></td>
<td>Integrated studies</td>
<td>Heilongjiang Provincial Seismological Bureau, Heilongjiang Provincial Archives</td>
<td>All area</td>
<td>Study on Toponymy of Wudalianchi Volcanic Area</td>
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<td></td>
<td>Volcanic/Geothermal systems</td>
<td>Volcano Institute of Heilongjiang Seismological Bureau, Heilongjiang Provincial Archives</td>
<td>Core area</td>
<td>Wudalianchi volcanic eruption observation records in 1720-1721</td>
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<td></td>
<td>Modeling</td>
<td>Institute of Geophysics, China Earthquake Administration</td>
<td>All area</td>
<td>Wudalianchi volcanic crust and upper mantle velocity structure receiver function inversion</td>
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<tr>
<td>Year</td>
<td>Geology/Geomorphology</td>
<td>Institution</td>
<td>Area</td>
<td>Description</td>
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<tr>
<td>2004</td>
<td>Geomorphology and Tourism Perturbations and resilience</td>
<td>Geological Environment Monitoring Station of Heilongjiang Province</td>
<td>All area</td>
<td>Wudalianchi volcanic landscape and its development and protection</td>
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<td>2005</td>
<td>Geology Geomorphology</td>
<td>Beijing University</td>
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<td>Wudalianchi volcanic soil and vegetation distribution and characteristics</td>
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<td>2005</td>
<td>Volcanic/Geothermal systems</td>
<td>China University of Geosciences</td>
<td>Core area</td>
<td>Study on Wudalianchi new volcanic magma chamber dynamic stability</td>
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<td>2006</td>
<td>Geology</td>
<td>Institute of Geology, China Earthquake Administration</td>
<td>Core area Buffer zone</td>
<td>Heilongjiang Wudalianchi Volcanoes Crust electrical property structure</td>
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<td>2006</td>
<td>Modeling Stakeholders' interests, Institutional and legal aspects Indicators of sustainability</td>
<td>China University of Geosciences Huangshan University</td>
<td>All area</td>
<td>Study on Geological Park Sustainable Development Mode Based on Geological Heritag--Taking Wudalianchi World Geopark for Example</td>
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<td>2007</td>
<td>Monitoring/Methodologies Heavy metals</td>
<td>Huangshan University</td>
<td>Transition zone</td>
<td>Wudalianchi Yaoquanshan mineral water strontium hydrogeochemical characteristics</td>
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<td>2007</td>
<td>Vegetation studies Monitoring/Methodologies</td>
<td>Qiqihar University Shandong University</td>
<td></td>
<td>Study on Wudalianchi Common Wild Nectar Plants</td>
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<td>2008</td>
<td>Indicators</td>
<td>China University of Geosciences, Geological Survey Bureau of Heilongjiang Province, China Geological Survey Bureau, Heilongjiang Institute of Geology and Mineral Test and Application</td>
<td>All area</td>
<td>Wudalianchi potassic volcanic rocks crust xenoliths characteristics and its geological significance</td>
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<td>Geology Geomorphology</td>
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<td>Algae</td>
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<td>Core area</td>
<td>Comparative Study on Central Asian Aerial cyanobacteria in volcanic landscape of Wudalianchi and Wangtian Canyon</td>
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<td>Integrated studies</td>
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<td>Volcanic eruption characteristics of Wudalianchi Laoheishan and Huoshaoshan</td>
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<td>Core area</td>
<td>Study on Wudalianchi volcanic avalanche deposits</td>
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<td>2010</td>
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<td>Beijing University</td>
<td>Core area</td>
<td>Study on Formation Mechanism of Air Injection Cone of Wudalianchi Volcano Cluster</td>
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<td>Endemic species, Genetic resources, Natural medicinal products, Species (re) introduction</td>
<td>Northeast Agricultural University, Heilongjiang TCM University</td>
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<td>AFLP Analysis on genetic diversity of Dryopteris fragrans germplasm resources</td>
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<td>2010</td>
<td>Biodiversity aspects</td>
<td>Northeast Forestry University Wudalianchi Management Committee, CAS Institute of Botany</td>
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<td>Features of major vegetation types in Wudalianchi scenic area</td>
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<td>Wildlife Rare/Endangered species</td>
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<td>All area</td>
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<td>2011</td>
<td>Geomorphology</td>
<td>Jilin University, Changchun University of Technology</td>
<td>Core area</td>
<td>Discovery of Wudalianchi Laoheishan and Huoshaoshan volcanic debris avalanche and accumulation and remodeling of eruption history and pattern</td>
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<td>Resource use</td>
<td>Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences</td>
<td>Transition zone</td>
<td>Wudalianchi mineral water and its medical value</td>
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<td></td>
<td>Resource use</td>
<td>Heilongjiang University of Chinese Medicine</td>
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<td>Study on Wudalianchi mineral mud therapy treatment for arthritis</td>
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<td>Siltation/sedimentation Pollution, pollutants</td>
<td>Northeast Agricultural University, Chinese Academy of Environmental Sciences, Heilongjiang Academy of Agricultural Sciences</td>
<td>Buffer zone</td>
<td>Distribution of different forms of phosphorus in Wudalianchi surface sediments</td>
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<td>2012</td>
<td>Acidic deposition/Atmospheric factors</td>
<td>Heilongjiang Wudalianchi Monitoring Station</td>
<td>All area</td>
<td>Wudalianchi Atmospheric PAHs Pollution Characteristics Wudalianchi atmospheric PAHs pollution source analysis</td>
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<td>Institution</td>
<td>Area</td>
<td>Description</td>
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</table>
| Ecosystem assessment             | Heilongjiang Provincial Environmental Monitoring Center Station  
Heilongjiang Provincial Academy of Environmental Sciences            | All area      | Assessment on Biodiversity in Heilongjiang Province                                                                                                                                                                                                                       |
| Indicators Microorganisms        | College of Life Science, Northeast Agricultural University, Chinese Academy of Environmental Sciences-Water Environmental Systems Engineering Laboratory | Buffer zone   | Wudalianchi water body nitrogen and phosphorus metabolism related microorganism differentiation characteristics                                                                                                                                                             |
| Indicators                       | Northeast Agricultural University  
Chinese Academy of Environmental Sciences                                | Buffer zone   | Study on Wudalianchi soluble organic phosphorite characteristics                                                                                                                                                                                                          |
| Monitoring/Methologies           | Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences                          | Transition zone | Study on divalent iron ions stabilization method in Wudalianchi bicarbonate mineral water                                                                                                                                                                                  |
| Microorganisms Pollution, pollutants | Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences                      | All area      | Investigation of Wudalianchi natural mineral water source microbial contamination                                                                                                                                                                                          |
| Modeling                         | China University of Geosciences  
Capital Normal University                                               | Core area     | Wudalianchi Laoheishan volcanic bombs and eruption column dynamics simulation                                                                                                                                                                                              |
| Resource use                     | Heilongjiang University of Chinese Medicine                                                                       | Buffer zone   | Philology Study on Wudalianchi mineral mud therapy development and application                                                                                                                                                                                           |
| Hydrology                        | Jilin University  
Heilongjiang Province Hydrogeology and Engineering Geology Exploration Institute                           | Transition zone | Hydrochemistical Evidence of groundwater circulation characteristics of Yaoquanshan in Wudalianchi                                                                                                                                                                           |
| Heavy metals                     | Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences  
Northeast Agricultural University                                    | Transition zone | Wudalianchi natural mineral water nickel element content and exploration                                                                                                                                                                                                 |
| Perturbations and resilience     | Wudalianchi volcanic earthquake monitoring station, Heilongjiang Provincial Seismological Bureau                 | All area      | Study on Wudalianchi volcanic seismic monitoring station surface wave magnitude deviation                                                                                                                                                                                  |
| Biotechnology                    | Institute of Volcanoes and Mineral Springs in Heilongjiang Provincial Academy of Sciences                         | All area      | Development of Wudalianchi pueraria mineral water drinks                                                                                                                                                                                                               |
| Perturbations and resilience     | Wudalianchi Volcanic Earthquake Monitoring Station                                                            | All area      | Analysis on Wudalianchi fluid abnority before/after 9 magnitude earthquake in Japan                                                                                                                                                                                         |
Ten thousand high quality papers have been published in the past ten years (see Figure 6-1); these research and monitoring results have provided scientific bases for the decision-making of Wudalianchi, provided data for establishment and implementation of various plannings in the reserve, provided strong support to the resource protection and scientific development, avoided errors in resource conservation and economic development, improved resource management and protection levels, and promoted economic restructuring and industrial restructuring (see Annex 9-6 Main Bibliography Updating List.)

Figure 6-1 Journals published by Wudalianchi in past ten years

6.3 Describe how traditional and local knowledge and knowledge from relating to management practices have been collected, synthesized and disseminated. Explain how such knowledge is being applied to new management practices, and how and if it has been integrated into training and educational programmes.

In the framework of the United Nations Educational programs, the reserve has given full consideration to the local natural landscape and cultural features, combined with its own characteristics and advanced management knowledge, opened the museum to the public free throughout the year; the visitor center, volcanic earthquakes exhibition hall and the reserve science museum show geosciences, biology, hydrology and other traditional and local knowledge to the local residents and tourists. The tourists to Wudalianchi will visit museums and science museum in the first place, and hundreds of thousands of people have received the popular science education per year.
1. WUDALIANCHI MUSEUM

The Museum has four exhibition halls, namely sandbox comprehensive demonstration hall, the biological and ecological hall, the time and space crossing hall and the resource protection and management hall. The comprehensive demonstration hall, with the total area of 276 square meters, is equipped with the sandbox demonstration system, which consists of three function parts, i.e. AutoPlay function, visitors interactive function and expostor operating function. The sandbox is produced based on 1:15000 topographic map of Wudalianchi Scenic Area, and six high-definition projectors are provided for synchronized playback and introduction. The presentation covers the basics of earth science, Wudalianchi volcanoes, lava highlights, volcanic dammed lake, Wudalianchi mineral water, biodiversity, resource protection and development, history and so on. Biological and ecological exhibition hall with the total area of 88 square meters has a schematic model of volcanic eruption and hundred pieces of animal and plant specimens. The model of volcanic eruptions indicates the spectacular scenes of volcanic eruption and Wudalianchi's unique geological process, and the specimens have shown the creature succession process from the lower grades to the higher grades. The time and space crossing hall has the total exhibition area of 88 square meters; the exhibition text description and rock samples will present more detailed and intuitive understanding for visitors to Wudalianchi, review the footprints of 14 volcanoes of Wudalianchi in more than 2 million years, help visitors explore the mysteries of nature, and uncover the mystery of the volcano. Resource protection and management hall has the total exhibition area of 32 square meters, which will mainly present the resource protection results of Wudalianchi Scenic Area by conscientiously implementing the national and provincial laws and regulations, displays centrally the awards won by Wudalianchi Scenic Area over the years, reflect Wudalianchi's glorious development process, and highlight brilliant moments.
Wudalianchi Museum has four exhibition halls, namely comprehensive hall, data studio, painting hall and local products hall. The comprehensive hall contains the display boards on such areas as the geoscience knowledge, the world’s volcanoes, Wudalianchi volcanoes, lava highlights, volcano dammed lake, Wudalianchi mineral water, biodiversity, resource protection and development, history in Chinese, English and Russian; Wudalianchi scenery films and popular science films are being played in the studio at any time; in the painting hall, calligraphy and paintings on Wudalianchi scenery will take you to the volcano art gallery; the local products hall has concentrated unique tourist souvenirs of Wudalianchi. Through images, text and pictures, the museum shows Wudalianchi volcanic geological formation and ecosystem evolution process and plays an important role for science education, foreign exchange, publication and promotion. In early 2004, the museum was designated as Chinese Geology University teaching practice base and student geology internship base; in April 2006, the museum was designated as Heilongjiang Province Youth Science and Technology Education Base by Heilongjiang Provincial Science and Technology Department, Provincial Propaganda Department, Education Department of Heilongjiang Province, and Heilongjiang Science and Technology Association.

3. WUDALIANCHI WORLD BIOSPHERE RESERVE MUSEUM

A large museum is under construction which integrates sound, light and electricity with high function of popularization of science and complete facilities covering an area of 13644 m2, it includes the show room, lecture hall, circular-screen movie studio, and the estimated annual reception capacity is 1.5 million passengers.
The reserve conducts the public education and training in a planned manner, which has been institutionalized. The scenic spot signs are popularized, and more than 1,000 explanation boards and signposts have been added in such major geo-ecological science expedition resorts as Heilong mountain, Huoshao mountain, Longmenshizhaishan, Wenbo and Bindong, etc. The science popularization has been professionalized, for such well-known geologists and ecologists as Tao Kuiyuan, Yang Rui, Zhuang Shouqiang, Liang Yongning had been invited to the reserve for lectures on ecotourism, biodiversity and science commentary and more than 3,000 personnel have been trained. The school style of education and training have been carried out, and more than 50 geological and ecological science camp activities have been conducted and over 5,000 people are educated each year; the science lectures and environmental art exhibitions are carried out in middle and primary schools; such popular science education activities as “Science Activities Week”, “World Earth Day” “World Environment Day” are conducted on a regular basis. The science popularization is diverse in forms. The special column of popular scientific knowledge is set on the website of the reserve; many universities have established teaching practice and research practice bases in Wudalianchi. In recent years, the reserve has produced such products as “Wudalianchi beautiful songs” CD, “Magical Wudalianchi” DVD (co-produced by CCTV and the Ministry of Land and Resources), the reserve feature film “Let the earth move”, “volcanic scenery” (played on CCTV-1 ), “Northland scenery” (Central Newsreel and Documentary Film Studio), 7 sets of the reserve films in Geographical China in CCTV 10 Science Channel; the Department of Education organized the compilation of local school textbooks on the reserve and popularize the reserve knowledge to primary and secondary schools; “Guo Bailin Photography Collection”; promotional brochure; science knowledge books, song
“Wudalianchi Ode.” At the meantime, the reserve is broadcast in CCTV, Heilongjiang TV station, Heihe TV, “Heilongjiang Daily”, “Heihe Daily” and other media. Wudalianchi Management Committee has organized special teams every year to publicize and promote the reserve.

Figure 6-4 Integration and dissemination of local knowledge

6.4 Environmental/sustainability education. Which are the main educational institutions (“formal” – schools, colleges, universities, and “informal” services for the general public) that are active in the biosphere reserve? Describe their programmes, including special school or adult education programmes, as these contribute towards the functions of the biosphere reserve. Comment on organizational changes (if any) in institutions and programmes that were identified in the biosphere reserve ten or so years ago (e.g. closed down, redesigned, new initiatives). Refer to programmes and initiatives of UNESCO Associated Schools networks, UNESCO Chairs and Centers where applicable.

There are elementary, middle and high schools in the reserve; the local Department of Education has prepared regional textbooks, highlighting Wudalianchi Volcano, ecological, geological science knowledge and rare species conservation value and relevant lessons will be given to students each semester with four lessons and 45 minutes in each lesson. For the adult education, the local Department of Education will develop education and training programs each year which will be executed by organizing various training courses, reserve knowledge contests and inviting experts for lectures.

6.5 How do you assess the effectiveness of actions or strategies applied?
After a decade of efforts, the reserve has achieved remarkable success in the protection and management, research and monitoring, teaching and training, and the logistical support function has been effectively carried out. In the past decade, 170 domestic and foreign scholars have come to the reserve for visit and research (more than 30 scholars from foreign countries), and they have published over a thousand high-quality articles; according to the network literature statistics and dynamic analysis on the papers published, their main research areas include volcanic geology, volcanic mineral, plant, animal, economy, tourism, agriculture and so on. Meanwhile, the scientific instruments and digital technology are applied to monitor mineral spring, atmosphere, hydrology, flora and fauna, etc., and the mineral resources are monitored every month. Environmental education has become lifelong education, and the local people from children to the elderly have the opportunity to receive education on resources and the environment. The reserve has made effective communication and cooperation with eight research institutes and 15 universities at home and abroad, so as to exert the logistical support function of the reserve, effectively promote resource conservation and recovery, and promote the scientific management and decision-making, and promote the economic sustainable development.

6.5.1 Describe the biosphere reserve’s main internal and external communication mechanisms/systems

Main internal communication mechanisms include Reserve Coordinating Committee; the public participation mechanisms include seminars, symposia, conferences, expert consultation and various meetings of the management organization.

Main external communication mechanisms include: communication and exchange with other biosphere reserves, participate in the International Conference on Man and the Biosphere, the reserve marketing, establish Wudalianchi official website, the official miniblog, the official WeChat, and other communication with the outside via E-mail, letters, faxes and so on.

6.5.2 Is there a biosphere reserve website? If so, provide the link.

6.5.3 Is there an electronic newsletter? How often is it published? (provide the link, if applicable).

No.

6.5.4 Does the biosphere reserve belong to a social network (Facebook, Twitter, etc.)?  
Provide the contact.

Social networks of the reserve include Wudalianchi Sina Weibo, Wudalianchi Sohu Weibo, Wudalianchi Tencent Weibo, Wudalianchi NetEase Weibo, WeChat and other platforms, contact: Yan Guangmin

E-mail: hbj16410@163.com

6.5.5 Are there any other internal communication systems? If so, describe them.

Yes. The internal communication systems include the video conferencing system, the network e-government and intranet telephone.

6.6 Describe how the biosphere reserve currently contributes to the World Network of Biosphere Reserves and/or could do so in the future.

6.6.1 Describe any collaboration with existing biosphere reserves at national, regional, and international levels, also within regional and bilateral agreements.

The reserve has conducted the international exchange activities to enhance contact with the outside world. It has went to Jeju Island in Korea, Cilento in Italy, Hawaii and other biosphere reserves for exchanges and learning. Implement the knowledge sharing and information exchange by getting access to EABRN website, the Chinese People and Biosphere websites.

The reserve has conducted exchange, learning and cooperation with Changbai Mountain, Saihanwula, Baotianman, Yancheng and other Biosphere Reserves at home. In 2012, the reserve dispatched 22 junior managers to three biosphere reserves, namely Jilin Changbai Mountain, Jiuzhaigou in Sichuan, Yunnan Xishuangbanna as well as eight advanced protection zones or park, i.e. Mount Tai in Shandong, Anhui Mount Huangshan, Jiangxi Mount Sanqingshan, Hangzhou West Lake, Yunnan Tengchong for tempering through titular positions. Through the regular exchange of visits, electronic communications and other means of information exchange, Wudalianchi has strengthened the exchanges and cooperation with
other reserves in science and culture and environmental protection, learnt advanced experience and practices from each other in terms of resource protection and management.

6.6.2 What are the current and expected benefits of international cooperation for the biosphere reserve?

After a decade of development, the reserve has fully recognized the importance of international cooperation and learnt a lot of advanced sustainable development management concepts and development manners in international cooperation, thus giving full play to the logistical support function of the reserve. The development of the reserve is an international career, and everyone is sharing the fruits of development. In the future, the reserve should undertake more relevant international and domestic meetings and conduct more exchange and communication with other members of Network of Biosphere Reserves, enhance international cooperation and promote the sustainable development of the reserve.

6.6.3 How do you intend to contribute to the World Network of Biosphere Reserves in the future and to the Regional and Thematic Networks?

Wudalianchi Biosphere Reserve is a typical representative of the evolutionary history of the earth, and it owns unique type of landforms and landscapes, unique natural scenery and cultural characteristics, and the world-class biodiversity. Therefore, it is of great value in exploring the reserve construction patterns, research survey and biodiversity conservation. Through promotion of monitoring, research, foreign exchange and public education, it has provided scientific basis for the resource and ecosystem protection and rational utilization, exerted Wudalianchi’s role in the World Network of Biosphere Reserves, enhanced the international influence of Wudalianchi Biosphere Reserve and made positive contribution to disseminate the ecological and geonomy knowledge and research the sustainable development of man and nature. It will strengthen contact with other members of the biosphere network, exert Wudalianchi role in the World Network of Biosphere Reserves and accelerate the global promotion of the Man and the Biosphere Programme. The works in the next step include: 1. increase international exchanges and cooperation further; make the similar resources protection experience exchange and cooperation globally; carry out cooperation with international, national and local universities; 2. undertake the world or China biosphere
reserve seminars, invite World Biosphere Reserve protection experts to attend World Biosphere seminars at Wudalianchi; 3. invite biosphere experts to make scientific investigation and research in the reserve, and provide logistical support for the experts; 4. build a large-scale comprehensive museum and strengthen the application of information and communication technology, enhance scientific knowledge biosphere publicity, make constant promotion and dissemination of the world biosphere protection concept, take efforts to build the reserve into a demonstration area of world biosphere reserve; 5. enhance the management level and give full play to the biosphere's three functions so as to benefit more people.

6.7 What are the main factors that influenced (positively or negatively) the success of activities contributing to the logistic support function? Given the experiences and lessons learned in the past ten years, what new strategies or approaches will be favored as being most effective?

In the past decade, Wudalianchi Management Committee has added the input in research, cooperation and investment, strengthened research efforts, updated scientific equipment, expanded exchanges and cooperation with outside world, and many research institutes and universities are involved in the research and monitoring of the reserve, so that its logistical support function is highlighted. As the reserve protection and development is accelerated, its logistical support function needs to be further improved; such problems as the shortage of funds, weak research capability and incomplete scientific equipment will emerge. The reserve will further increase capital investment and adopt the open mode of going global and attracting foreign investment to contribute more to the World Biosphere Reserve.

6.8 Other comments/observations from a biosphere reserve perspective.

World Biosphere is an important network platform and the protection on cultural diversity, environment, ecology and biodiversity need efforts of related parties. We should explore the community and reserve's sustainable development model by strengthening cooperation with the World Man and the Biosphere Network and China Network of Biosphere Reserves.
7. GOVERNANCE, BIOSPHERE RESERVE MANAGEMENT AND COORDINATION:

[Biosphere reserve coordination/management coordinators/managers have to work within extensive overlays of government bodies, business enterprises, and a “civil society” mix of non-governmental organizations and community groups. These collectively constitute the structures of governance for the area of the biosphere reserve. Success in carrying out the functions of a biosphere reserve can be crucially dependent upon the collaborative arrangements that evolve with these organizations and actors. Key roles for those responsible for the biosphere reserve coordination/management are to learn about the governance system they must work within and to explore ways to enhance its collective capacities for fulfilling the functions of the biosphere reserve.

7.1 What are the technical and logistical resources for the coordination of the biosphere reserve?

There are different interest groups in the reserve, including Wudalianchi Management Committee, businesses, towns, farms, central/provincial/municipal units and community residents. For the better and more effective development, Wudalianchi Management Committee has established a number of coordination institutions/mechanisms to provide technical and logistical support.

For the technical coordination, under the premise of giving priority to protection, in the framework of laws, regulations, programs and policies, the Coordinating Committee coordinate and solve major issues of the reserve in the principle of mutual benefit to stakeholders. For the specific problems and conflicts, the unilateral/bilateral consultations and symposia are held between Wudalianchi Management Committee and stakeholders or among different stakeholders; in addition, there are administrative coordination, legal coordination and community coordination.

Logistical resources: Government agencies, research and monitoring agency, talent pool, financial security, corporate environmental protection management organization, community volunteers, environmental associations in community groups.
7.2 What is the overall framework for governance in the area of the biosphere reserve?

Identify the main components and their contributions to the biosphere reserve.

In 2006, Wudalianchi World Biosphere Reserve Coordination Committee was established. The Coordinating Committee consists of personnel from all stakeholders of the reserve, including Wudalianchi Management Committee, the surrounding city and county governments, other enterprises and public institutions, environmental protection associations, residents and villagers' committees, individual and private associations and advisory committees. Wudalianchi Management Committee is specifically responsible for the daily work.
Wudalianchi Management Committee is the protection and management organization of the reserve, which is attached to Heihe Municipal Government and implements the central leadership and management on economic and social administrative affairs and natural resources in the administrative regions on behalf of Heilongjiang Provincial Government and Heihe Municipal Government. It carries out the central planning, central protection, central development and central management on the reserve and owns the administrative management authority of county-level government. In businesses, it is guided by China Man and Biosphere Committee, the Ministry of Environmental Protection, the Ministry and the State Forestry Administration.Wudalianchi Management Committee comprises seven bureaus, one office and two departments inside, forming a system of organization. Since 2003, the Forestry Bureau, Environmental Protection Agency, Water Bureau, Animal Husbandry and Fishery Bureau and other protection and management departments have been set up in succession.Wudalianchi Management Committee is responsible for managing enterprises, institutions, communities, farms, environmental protection associations, community volunteers and stakeholders in the reserve.

Contribution to the protection: various stakeholders, under the coordination of Wudalianchi Management Committee, exert their enthusiasm and initiative to commit themselves to the biosphere protection so that resources can be effectively protected and the ecological environment further improved.

Figure 7-1 Reserve Office
7.3 Describe social impact assessments or similar tools and guidelines used to support indigenous and local rights and cultural initiatives (e.g. CBD Akwé:Kon guidelines, Free, Prior, and Informed Consent Programme/policy, access and benefit sharing institutional arrangements, etc.).

1. Establish the broad and deep public participation mechanisms and strengthen the contact and cooperation between the management department and the community, among communities and between the community and residents. Under the premise of extensive collection of comments and full discussion, determine the development orientations of the communities. 2. Establish education and training mechanisms, strengthen the local residents' knowledge on their own national history and culture, environment resources and tourism activities, and cultivate the community sense of pride. At the meantime, train the residents on resources protection, tour guide, interpretation, logistics and rescue, and improve the resources protection and tourism service quality. 3. Establish clear and detailed resource protection mechanism according to the local pacts. 4. Complete the infrastructure construction and enhance the local people's living standard. 5. Replace the traditional firewood energy by clean energies, which can meet community needs while reducing pollution. 6. In order to ensure the health of the community and the environment, establish the strict monitoring system, including the monitoring records of material resources and non-material resources, and ensure that the impact of human activities on the environment is under control. 7. The benefit distribution management must be fair, and the revenue should be applied for resource protection and improvement of the living standards of the community.

7.4 What (if any) are the main conflicts relating to the biosphere reserve and what solutions have been implemented?

7.4.1 Describe the main conflicts regarding access to, or the use of, resources in the area and the relevant timeframe. If the biosphere reserve has contributed to preventing or resolving some of these conflicts, explain what has been resolved or prevented, and how this was achieved for each zone?
It is mainly the conflict between conservation and development. Prior to 2003, the regional resource protection measures were lacking, rules and regulations incomplete, and there were some conducts which could affect the environment and resources in the reserve. After joining the MAB network, Wudalianchi Management Committee has taken active measures to fully stop timber harvesting, close hillsides to facilitate forestation, strictly prohibit illegal hunting, deforestation, illegal excavation and indiscriminate reclamation, shut down small wells, and install tap water for the residents. It has developed the whole region protection and development plan, which, under the premise of protection, has specified that all the development in the reserve should not damage the environment, ruin resources or do harm to the ecology. In 2006, Heilongjiang Province formulated Regulation on Administration of Wudalianchi World Geopark, which proposes to enhance the production and living conditions of residents in the core area and buffer zone, restore the ecological environment in the core area and buffer zone, relocate residents in the core area and residents along the lake and lava plateau to the living area with international standard, relocate them from low and wrecked bungalows to the large and bright storeyed buildings, and recover the ecology of the area in 200m along the lake and lava plateau by returning farmland to woodland. In 2009, Heilongjiang Government held the 35th special session in the reserve to further deploy and implement the ecological restoration tasks in 2006 and put forward series requirements for the logistic support on Wudalianchi resources protection and development. After closing off forestry, workers turn to make a living by the forest management and protection rather than cutting woods in the past. After the full harvesting and closing off hillsides, the State and Government will pay salaries to workers to manage and protect the forest and ensure their livelihood. After the relocation, the residents can enjoy a better living environment and conditions, and improve their quality of life. The reserve adopts the economic compensation to withdraw land for farming. After farmland returning to woodland, the economic compensation or personnel placement is arranged for the original land owners; the personnel placed are organized to form the resources management and protection team to manage and protect the ecological resources.
Conflicts for stakeholders in getting access to and use the regional resources. Stakeholders while getting access to and making use of the regional resources will encounter some contradictions and conflicts due to different concept, purpose and usage manners. These conflicts are resolved by coordination, negotiation as well as legal, administrative and economic approaches.

7.4.2 Describe any conflicts in competence among the different administrative authorities involved in the management of the area comprising the biosphere reserve.

Heilongjiang Provincial Government has clearly stipulated by administration laws and regulations that the reserve will be under the central planning, protection, development and management of Wudalianchi Management Committee, so there are no conflicts in competence among the different administrative authorities.

7.4.3 Explain the means used to resolve these conflicts, and their effectiveness. Describe its composition and functioning, resolution on a case-by-case basis. Are there local mediators; if so, are they approved by the biosphere reserve or by another authority?

During the conservation and management, the reserve has also encountered some contradictions and conflicts, which were resolved usually by coordination, consultation and legal, administrative, economic, community councils and other channels. The conflicts were effectively addressed and resolved. For example, the important matters and problems are resolved by coordination in the reserve; the specific conflicts are resolved through unilateral, multilateral community board. The conflicts involving interests are mainly economic solution. The conflicts among different interest groups should be resolved through administrative or legal solutions if they can not be coordinated.

There are a variety of coordinators in the reserve who are appointed by the reserve management agency, recommended or elected by voting. For example: for relocation of residents in the core area and buffer zone, the resettlement programs are developed and it is completed mainly through the coordination of economic means; for the violations of the environment, the integrated environmental management programs are formulated and the problems are solved mainly through administrative means in accordance with the laws and regulations.
7.5 Updated information about the representation and consultation of local communities and their participation in the life of the biosphere reserve:

7.5.1 Describe how local people (including women and indigenous people) are represented in the planning and management of the biosphere reserve (e.g., assembly of representatives, consultation of associations, women’s groups).

Wudalianchi Management Committee attaches great importance to the role of the local people on protection, planning and management. The representatives of local people will participate in the planning, protection and management of the reserve. Representatives are elected from all sectors of the community, and businesses, associations, communities, advisory committees have a certain percentage in the Coordination Committee (including a certain proportion of women representatives). The Coordination Committee will primarily conduct coordination and discussion on major issues and decisions on the reserve. Seminars, conferences and talkfest will be attended by some stakeholders mainly for some specific issues. Resident representative may reflect their views on the reserve via suggestions or joint proposals. The management agency will organize representatives annually to inspect and visit the reserve and put forward comments and suggestions.

7.5.2 What form does this representation take: companies, associations, environmental associations, trade unions (list the various groups)?

These representatives come from different levels, and are elected mainly by the government, community committees, village committees, trade unions, women’s federations, businesses, environmental associations, advisory committees, individual and private associations, and they will get involved in the reserve by means of associations or business consortium.

7.5.3 Indicate whether there are procedures for integrating the representative body of local communities (e.g., financial, election of representatives, traditional authorities).

Yes. The Reserve Coordination Committee members are recommended or selected through a rigorous process by the various stakeholders, and they are changed every five years; these representatives have high authority in various sectors or areas.
7.5.4 How long-lived is the consultation mechanism (e.g., permanent assembly, consultation on specific projects)?

The Permanent Reserve Coordination Committee is established, and the members are changed every five years. Wudalianchi Management Committee is responsible for the management of the reserve.

The reserve office is located in the Environmental Protection Bureau. The Coordinating Committee's work will focus mainly on consultation and decision on major issues and decisions of the reserve, such as carrying out the comprehensive closing of hillsides to facilitate afforestation, returning farmland to forest and grass, resettlement, environmental remediation and so on.

7.5.5 What is the impact of this consultation on the decision-making process (decisional, consultative or merely to inform the population)?

The Reserve Coordinating Committee plays a decisive role in decision-making for the reserve, and the rules of procedure is voting and follows the majority rule. The seminars and conferences will fully listen to opinions of participants, respect wishes of local residents, reply to all proposals and suggestions of representatives and adopt the reasonable proposals in the research report.

7.5.6 At which step in the existence of a biosphere reserve is the population involved: creation of the biosphere reserve, drawing up of the management plan, implementation of the plan, day to day management of the biosphere reserve? Give some practical examples.

Wudalianchi Management Committee has established a clear co-management mechanism with various stakeholders or their representatives to strive for multi-support. The local residents participate in the reserve design, management/cooperation formulation, planning implementation and routine management. The local people are closely linked with the reserve for mutual promotion and common development. In the reserve creation process, Wudalianchi Management Committee widely listened to views of local residents, distributed 2,000 questionnaires, held 5 informal meetings, 3 coordination meetings, and the creation of the reserve is welcomed by the locals; the development of the management/cooperation plans is closely linked to the active participation of locals. For example, for the formulation of the
reserve overall planning, since the locals are familiar with the conditions, they participated in the planning actively and attended three planning discussion meetings to provide many valuable suggestions, and the master planning of the reserve has been revised three times according to their opinions. Any planning implementation is inseparable from the participation of local people. For example, in order to protect the mineral resources, the individual small wells must be closed, the locals cooperate actively and consciously closed their own small wells. Daily management of the reserve is inseparable from the active participation of local people; through a variety of meetings, such as coordination meetings, seminars, conferences, they actively participate in the daily management, while the environmental volunteers, environmental supervisors and resource management and protection personnel participate in the management and protection of resources every day.

7.6 Update on management and coordination structure:

7.6.1 Describe any changes regarding administrative authorities that have competence for each zone of the biosphere reserve (core area(s), buffer zone(s) and transition area(s))? If there are any changes since the nomination form/last periodic review report, please submit the original endorsements for each area.


7.6.2 Update information about the manager(s)/coordinator(s) of the biosphere reserve including designation procedures.

1. Establish the significant event coordination mechanism. In 2006, the Reserve Coordination Committee comprising 55 members from all aspects of the reserve was established. The coordinating committee will hold two meetings annually, and the meeting will be held immediately if major issues and important decisions are involved.

2. Establish the mechanism for public participation. Wudalianchi Management Committee has established a clear co-management mechanism with various stakeholders or their representatives to strive for multi-support. Local residents participate in the reserve
3. Establish the sound management system. The reserve inside has prepared the supervision system involving more than 100 items in 8 aspects including air, water, geological heritage, woodland, grassland, biology and so on and developed the contingency plan involving 16 aspects so as to form a complete system of protection and management.

4. Establish the resource patrol system. Establish the monitoring and management mechanism based on the integrated law enforcement, establish the resources and environment comprehensive inspection team composed of 120 people from multiple departments involving environmental protection, land, planning, forestry and so on to make the regular inspection tours every week to identify and solve problems timely. Establish innovative monitoring system to monitor and record the protection process participated in by the community and the protection effectiveness; constantly sum up experience and lessons of demonstration projects to enhance the understanding and recognition to community protection (especially eco-compensation) in the process of formulating the relevant laws and obtain the wide support of government and the community.

5. Strengthen administration by law, and prohibit behaviors that may affect the resources and the environment. Employ the experts from provincial and municipal Office of Legislative Affairs to hold several administrative law enforcement personnel training courses and make intensive training of law enforcement personnel. Since 2003, more than 20 cases of affecting or damaging resources have been investigated.

6. In 2006, Heilongjiang Provincial People’s Congress promulgated the local protection regulation *Wudalianchi Geopark Protection Act*, and revised it in 2010, which has defined the reserve management agency, authority, protection, management, and punitive measures so as to provide legal protection for the legal protection.

7.6.3 Are there any changes with regard to the coordination structure of the biosphere reserve? (if yes, describe in details its functioning, composition and the relative proportion of each group in this structure, its role and competence.). Is this coordination structure
autonomous or is it under the authority of local or central government, or of the manager of the biosphere reserve?).

There are some changes. In 2006, the Reserve Coordination Committee was established and it is composed of 55 people from various aspects of reserve (11 women representatives), including 28 from Wudalianchi Management Committee, 6 people from the surrounding county and city governments, and 21 people from other organizations (enterprises, environmental protection associations, residents, village committees, individual and private associations, the Advisory Committee). The Biosphere Reserve will convene 2 meetings annually, and the meeting will be held in a timely manner when major issues and important decisions are involved. The Reserve Coordination Committee is not a government agency, but the deliberative body of the reserve. The reserve managers are responsible for chairing the meeting and the Reserve Coordinating Committee members are primarily the leaders of Wudalianchi Management Committee.

7.6.4 How has the management/coordination been adapted to the local situation?

1. Sound management coordination agency. Reserve Coordination Committee was established in 2006. Wudalianchi Reserve Management Committee is responsible for managing all planning, protection, monitoring, scientific research, tourism and the development and construction of the reserve. The departments set inside Wudalianchi Management Committee, which are directly related to the resource protection, include Land and Resources Protection Bureau, Environmental Protection Bureau, Council of Agriculture, Construction Bureau, Planning and Comprehensive Law Enforcement Bureau, Forestry Bureau, Tourism Wellness (area) Authority, Animal Husbandry and Fishery Bureau, Water Bureau, Environmental Monitoring Station, Volcano Monitoring Station and so on. In addition, the digital information monitoring center and research center are also established to strengthen the scientific conservation and management of the reserve.

2. Improving the management by monitoring. Wudalianchi Management Committee has established the reserve monitoring system comprising the management monitoring system and the technology monitoring system. Now four levels of monitoring departments have been established, including national monitoring agency of Wudalianchi volcanic
earthquake monitoring station, Heilongjiang Provincial monitoring agencies: Heilongjiang Wudalianchi environmental monitoring station, Heilongjiang Academy of Sciences, Institute of volcanoes and mineral springs; Heihe municipal monitoring departments: Heihe City Municipal Environmental Protection Bureau and Heihe Bureau of Meteorology; Wudalianchi Management Committee internal monitoring departments: Department of land, water sector, the forestry sector, animal husbandry and aquaculture sector, the tourism sector, environmental protection department.

3. Management by contracts and traditional ways. The village regulations and non-governmental agreements are conventionalized by residents' codes of conduct, developed and abided jointly by the residents; it is a primitive form of law and conduct guidelines for community residents with high validity and operability. While the local community residents adapt to the environment in the long term, they also take some traditional ways to protect their living environment, in which one of the typical ways is the residents develop and modify the pacts in order to protect the surrounding environment. For example, Wudalianchi town pacts have made specific provisions on "strictly prohibiting field fire, deforestation and indiscriminate excavation of sand and stone". Pacts development has enhanced the residents’ awareness of the protection for natural resources, stimulated the active participation of local residents, improved social management capabilities and self-discipline, and played an effective role to more effectively manage the local ecological environment, ecosystems and natural resources.

7.6.5 Was the effectiveness of the management/coordination evaluated? If yes, was it according to a procedure?

After years of development, the reserve has made exploration in the management coordination system and mechanism and improved constantly the scientific and effective management and achieved remarkable results in the reserve resource conservation and recovery, so the ecological environment is getting better, the economy in the reserve developed rapidly, and people's living standards improved. In 2009, the reserve received the honorary title of “advanced collective in nature reserve management”. In August 2009, the national evaluation team consisting of members from seven ministries and commissions
including the Ministry of Environmental Protection, Ministry of Land and Resources, Ministry of Forestry evaluated the management of reserves; through field visits, access to documents and information, evaluation and discussions, the final evaluation report came into being. The report fully affirmed the management of reserves and considered that since Wudalianchi Nature Reserve was established, under the leadership of Heilongjiang provincial government and Heihe City government as well as the support and coordination of relevant departments, the management and protection work is standard, protected objects stable, and development prospects broad. The reserve’s institution-building and staffing are complete and the internal rules and regulations are sound and providing adequate protection for routine management work; the protection funding increases every year, the investment is sufficient so as to ensure the normal operation of the work; the infrastructure construction is relatively complete, patrol vehicles, monitoring equipment, fire protection equipment, communications equipment are in sound conditions; the publicity and education work is good; the visitor center and museum have been built to actively carry out the ecological education on surrounding masses, schoolchildren and tourists.

7.7 Update on the management/cooperation plan/policy:

7.7.1 Are there any changes with regard to the management/cooperation plan/policy and the stakeholders involved? If yes, provide detailed information on process for involvement of stakeholders, adoption and revision of the plan.

In the protection and development process, for the management, coordinated planning, policy and other aspects of the reserve, particularly when the preparation and revision of planning and reserve significant events and important decisions are involved, the reserve will solicit and incorporate the views of stakeholders by means of questionnaires, written comments, expert consultation, stakeholder forums, seminars and so on.

Management by planning. *Wudalianchi Geopark Protection Regulations* was issued in 2006 and revised in 2010, and it has further clarified the reserve management body functions, standardized resource protection and management and provided important legal support for the reserve management and protection. *Heilongjiang Wudalianchi Volcanic Geological*
Heritage National Nature Reserve Master Plan is being edited and revised by the Ministry of Environmental Protection, Nanjing Institute of Environmental Science under commission.

7.7.2 Describe contents of the management/cooperation plan (provide some examples of measures and guidelines). Is the plan binding? Is it based on consensus?

Heilongjiang Wudalianchi Volcanic Geological Heritage National Nature Reserve Master Plan has determined the guiding ideology and basic principles of the “protection first, moderate development and sustainable use”; divided the function zoning of reserves and the geological heritage protection levels; presented requirements and measures for the protection of the volcanic geological relics, mineral water, forests, wildlife, land and other natural resources and the ecological and environmental protection; proposed the framework on the development of the three pillar industries of tourism, mineral water, green agriculture, and put forward constructive comments on advocacy for science and education, infrastructure construction and management bodies. In short, the plan has played an important role for the reserve conservation, management, construction and economic development.

In the compilation process, the plan has solicited the views of all sectors of society, and received unanimous consent, and it is binding after approval by the relevant authority.

7.7.3 Describe the role of the authorities in charge of the implementation of the plan. Describe institutional changes since the nomination form/last periodic review report. Please provide evidence of the role of these authorities.

Wudalianchi Management Committee is the reserve planning implementation body and it is responsible for conservation, planning, utilization and management of the reserve. Wudalianchi Management Committee’s main responsibilities are: 1, implement laws, regulations and rules, and investigate the violation of planning; 2, organize the plan preparation, revision and implementation; 3, examine and approve construction projects in the reserve in accordance with the approval authority; 4, in accordance with the planning, develop the planning, rules and regulations of the reserve, and organize the implementation; 5, according to the planning, manage and supervise the reserve conservation, use, construction and tourism service industry; 6, set up and manage various types of files according to planning requirements.
Management agencies implement planning, take effective maintenance and protection of undisturbed ecosystems in the reserve, so that interference factors are eliminated and threats under control. Visitors' awareness and satisfaction with the reserve are further improved. The relocation and resettlement of small-scale and scattered communities in the reserve are completed, and the demolition and relocation of the larger communities are partially completed, so that the ecological environment has been initially restored and the population size has been effectively controlled. The infrastructure of communities retained in the reserve according to the planning has been significantly improved. The industrial restructuring in the reserve has been initially completed; the community residents job placement rate has reached a high leve; the public participation mechanisms has been significantly improved. The monitoring of environmental quality is in full swing, and the monitoring data are effectively applied. Research activities are conducted in an orderly manner and the initial results have been obtained. Management institutions and coordination mechanisms have been improved; the awareness of managers on the value of the reserve has been further enhanced; the protection and management expertises are significantly strengthened. Planning and implementation agency has not changed in the past decade.

7.7.4 Indicate how the management plan addresses the objectives of the biosphere reserve.

Reserve planning is being prepared at present. At present, the reserve is managed based on *Heilongjiang Wudalianchi Volcanic Geological Heritage National Nature Reserve Master Plan*. Planning objectives: in the principle of giving priority to protection, improve protection measures and achieve strict management; establish and improve resource management and protection system and the law enforcement system, improve infrastructure construction, maintain the integrity, representativeness and diversity of geological relics and ecological environment types, improve the comprehensive capability of the reserve in the conservation, management, research, missionary, breeding, production, foreign cooperation, enhance the reserve’s economic strength and self-development capability, develop the protection zone gradually into an open and diversified reserve with advanced equipment and first-class management and a national first-class integrated reserve with international standard integrating scientific investigation, tourism, mineral water processing and eco-agriculture.
immediate objective is to strengthen the protection facilities construction, further adjust the management system and institution, and implement the industrial restructuring. The medium and long-term goal is to strengthen the construction of patrol and fire facilities, carry out sustainable business management and protection, improve logistics and living facilities construction, complete the upgrades of transportation, communications and other equipments, establish and improve the scientific research system, the resource file management system, eco-tourism system, personnel training system, scientific management and law enforcement system, develop diversified economy, help community residents to get rich, so that the protection zone can enter the coordinated development of protection, research, science popularization and rational use of resources and become an open, diverse type first-class reserve.

7.7.5 What are the progresses with regard to the guidelines of the management/cooperation plan/policy?

The planning is advanced, for the traditional concept of restraining the development for development is abandoned and the blind development idea of ignoring the environmental price in order to go for the economic development, and the sustainable development of environmental, economic, and social coordinated development. Choose and determine a certain time and area for a certain number of legitimate stakeholder to conduct legal productive activities under the supervision and management of the reserve management institution and make them become direct participants and managers for utilization and protection of waters, wetlands and forests by means of paid use of natural resources or additional obligations for resources share, so as to achieve the objective of “maximizing the joint interests of resource conservation and rational exploitation and management, minimizing the management costs, conflicts and disputes”. Under the premise of achieving the full protection, the scientific and rational planning and construction have helped community residents to find a suitable alternative industries, and the reserve is gradually developed into a multi-functional integrated ecological demonstration zone with the community co-management, ecological protection, rational exploitation and sustainable use.
7.7.6 Were there any factors and/or changes that impeded or helped with the implementation of the management/coordination plan/policy? (Reluctance of local people, conflicts between different levels of decision-making).

The planning is the result of scientific verification and it must be attended and approved by the vast majority of people in the reserve; once approved it has binding force and is of great guiding significance to the long-term development of the reserve. Local communities and relevant units place the interests of the reserve in the first position and support the planning of reserve. But the plan implementation process itself is a benefit re-adjustment and redistribution process, in which the interest losses of a few people or units can be resolved through coordination, consultation and financial compensation.

7.7.7 If applicable, how is the biosphere integrated in regional/national strategies? Vice versa, how are the local/municipal plans integrated in the planning of the biosphere reserve?

(Please provide detailed information if there are any changes since the nomination form/last periodic review report).

Adhere to the people-oriented concept and harmonious development between man and the reserve; the reserve planning is prepared based on national, provincial, city planning, laws and regulations, industrial policy, environmental policy thus ensuring harmony and mutual complementation.

8. CRITERIA AND PROGRESS MADE:

[Conclude by highlighting the major changes, achievements, and progress made in your biosphere reserve since nomination or the last periodic review. How does your biosphere reserve fulfill the criteria. Develop justification for the site to be a biosphere reserve and rationale for the zonation. What is lacking, and how could it be improved? What can your biosphere reserve share with others on how to implement sustainable development into practice?

Brief justification of the way in which the biosphere reserve fulfills each criteria of article 4 of the Statutory Framework of the World Network of Biosphere Reserves:}
1. "Encompass a mosaic of ecological systems representative of major biogeographic region(s), including a gradation of human interventions". (The term "major biogeographic region" is not strictly defined but it would be useful to refer to the Udvardy classification system (http://www.unep-wcmc.org/udvardys-biogeographical-provinces-1975_745.html)).

The Reserve is the chimera of five kinds of ecosystems, including lichens and shrubs vegetation types of ecosystems, forest meadow vegetation types of ecosystems, lowland and wetland meadow vegetation types of ecosystems, rivers/lakes aquatic ecosystems, and land ecosystems. According to Udvardy biogeographic regionalization system, the reserve is located in Palaearctic biogeographic region and the temperate broad-leaved mixed forest biome. Specifically, it is temperate mixed forest ecoregion (PA0426) (WWF), located in the transition zone between China’s Songnen Plain and Lesser Khingan Mountains, and it is also impacted by the European - Siberian coniferous forest and the Eurasian steppe zone. After a decade of capacity building for sustainable development, the habitats of birds have been restored and improved; here is known as BirdLife International’s International Bird Area and listed as A1 Bird Area, for it is of great significance to some endangered birds protection, including the red-crowned crane (Grus japonensis), crane (Grus leucogeranus) (the reserve is in the annual migration route of these birds). And more importantly, the reserve has important significance in international network; in terms of geography, it is located in WWF Amur - Heilongjiang River Regional Center; at the meantime this is also a World Biosphere Reserve. Compared with other single-cause volcanoes, Wudalianchi ecosystem has presented the ecosystems succession sequence of biological succession from lower organisms to higher organisms created by many volcanic eruptions from prehistoric 2 million years to recent 290 and generated the mosaic evolution of ecosystems from low level to top level. Therefore, the ecosystem types of reserves are complete; a variety of habitats are intertwined; various ecosystems distribution is more concentrated and diverse. The rare and complete ecological succession is not only an important factor constituting a unique volcanic landscape but also a precious place to observe and research the volcanic ecosystem.
Not only is the reserve networked but it also integrates the reserve with the scientific research, environmental monitoring, personnel training, demonstration role and the involvement of local residents. Its purpose is to preserve the biological genetic diversity by protecting the volcano types of ecosystems in northern China. The Reserve is a protected typical northern boreal regions volcanic region, and its conservation value has gotten domestic and international recognition, and it can provide such values as scientific knowledge, skills, and sustainable development by human. The reserve shares the ecosystem protection and management data with the world. The reserves include the strictly protected “core area”, and peripheral “buffer zone” for research, environmental education, training, etc., as well as the outermost larger “transitional zone”, which is available the close cooperation between the researchers, operators and the locals to ensure the rational development and utilization of natural resources in this area.

2. “Be of Significance for biological diversity conservation”.

For decades, through biodiversity conservation, the reserve has actively improved and repaired the ecological environment, promoted the harmonious development of man and nature, achieved sustainable use of resources, and promoted local economic and social development. In 1060 square kilometers of land, 14 volcanoes erupted in different periods have formed China and even the world’s most typical and the most complete and most distributed recent volcanic eruption remains. These special patterns of volcanic landscape have changed the reserve topographic structure as well as distribution of zonal soils and vegetation, forming the pattern with complete ecosystem types, more concentrated and diverse distribution, and intertwined ecological environment, and its biological diversity in the world's northern temperate latitudes is also extremely rare. The plants in reserves involve 143 families, 428 genuses and 1044 kinds, including such rare species as manchurian walnut (Juglans mandshurica Maxim), northeast China ash (Fraxinus mahdshurica Rupr), obtuse leaf Poisson (Orostachys malacophyllus), amur corktree (Phellodendron amurense Rupr), wild Soybean (Glycine soja sieb &amp; Zucc) and so on. 89 families and 396 kinds of animals live here including such national rare species as bustard (Otis tardadybouskii), merganser (Nyroca baeri), Red-crowned Crane (Grus japonensis) and so on. In the new volcanic zone, lichen
communities, lichen moss communities, lichen communities ferns, lichens grass communities, lichens shrubs, lichen woodland, moss larch forest communities are located in the volcanic rock and lava plateau, staggered and inlaid in the new volcanic landforms landscape formed in the recent 300 years; in the old volcanic area, the miscellaneous meadow, shrub miscellaneous meadow, forest meadows, broadleaved deciduous forest, and mixed coniferous broad leaved forest come into being; in the valleys, the submerged plant communities, floating plant communities, emergent plant communities, angustifolia Carex, Calamagrostis angustifolia Miscellaneous meadow come into being.

3. “Provide an opportunity to explore and demonstrate approaches to sustainable development on a regional scale”. (Including examples or learning experiences from putting sustainable development into practice).

Adhering to the premise of protection first, through the strict protection on the biological and cultural diversity, the reserve has gradually explored a sustainable development road with harmony between man and nature, as well as common progress in environment, economy and society. Leading industry has achieved rapid development: through developing new attractions, improving infrastructure, developing tourist souvenirs, and expanding tourism product promotion, the tourism industry has achieved rapid growth in tourism revenue; the total revenue in 2012 was 263 million yuan, 6.5 times of that in 2003; through improving services and facilities, strengthening the research on the mechanism of mineral water treatment, the health care industry has achieved rapid development; in 2012 the number of customers for health care is 300,000, three times to that in 2003; through increasing investment, integrating the mineral water market, cultivating leading enterprises, and building mineral spring brand, the mineral water industry has achieved the rapid development; in 2012 the annual production was 60,000 tons, 15 times to that in 2003; for the agricultural development, the picking agriculture, tourism agriculture, ecological agriculture are developed so that the agricultural and tourism are integrated closely.

The rich and diverse natural resources, landscape and ecosystems provide a foundation for the sustainable development within the region, and there is huge potential for further
development. For example, there are 14 different volcanic cones in the reserve, in which only two are developed; two are under development; ten are still undeveloped; the annual mineral water upwelling capacity is 20 million tons in which only 60,000 tons are developed; flowers, fruits and vegetables grown in the transition area have provided a huge potential for the local sustainable development.

4. “Have an appropriate size to serve the three functions of biosphere reserves”.

The total area of the reserve is 106,000 hectares, the core area is 10,614.61 hectares, including the new volcanic area and the old volcanic zone; the buffer zone is 13,546.09 hectares, including dammed lake, 10 volcanic cones; the transitional area is 81,839.30 hectares, and it is the main area for production and living.

5. Appropriate zonation to serve the three functions

Reserve has three major functions: protection, development and logistical support. It will play the protective function in the core zone, the protection and support function in the buffer zone, and the protection, development and logistic support function in the transition zone. Zoning principles: 1, it can reflect more fully the overview of natural ecosystems in the reserve, the original nature and state between species and the environment; 2, it is conducive to the conservation of biological diversity and the unique natural landscape; 3, highlight the original evolution of the vegetation of the region, plants intersection, relict plant antiquity, and other characteristics; 4, ensure the core area control and contrast function and the minimum limit area for the original condition preservation; 5, it is conducive to scientific research and various construction, management and operation measures under the premise of protection.

The core area is 10,614.61 hectares, including new volcanic area of 1841.99 hectares and the old volcanic area of 8772.62 hectares. New volcanic area includes Laoheishan, Huoshaoshan cones, where the new volcanic geological heritage and the new volcanic plants are protected, and the rock decomposition and primary succession of plants step by step can be observed clearly and the original plant succession is reflected in microcosm. The old volcanic area includes East and West Longmenshan cones, where the biological succession and development process of volcanic vegetation since prehistoric million years is protected.
Two vegetation floras have mutual penetration here, so it is a rare plant border zone and the best place to study vegetation regionalization. The vegetation type landscape with two crossing and coexisting floras has high value from both the scientific perspective or from a landscape perspective. The core area is less disturbed by human activities, and all kinds of vegetation keep a very high original condition.

Buffer zone covering 13,546.09 hectares is Wudalianchi reserve old volcanic vegetation area where the most of plantation is broadleaf secondary communities. The region has rich various ecosystems, covering not only the forest ecosystem, but also water ecosystems, grassland ecosystems, forest, shrub, elfin forest and other ecological communities. There are only a small number of settlements in the buffer zone, such ecological systems as forests, grasslands and waters keep good original condition. The main function of the buffer zone is to enhance the protection and contract function of the core area and carry out a variety of scientific research under the premise of protecting the existing plants in the reserve, and promote the ecosystem stability and development in the reserve.

The transition area covering 81,839.30 ha is located in the buffer zone periphery with relatively numerous and concentrated population and arable land, and the main function is to coordinate the relationship between the protection and the mass production and life, carry out ecological agriculture, develop various types of production industries in the reserve, stabilize and improve local people’s life. The area is concentrated with natural landscape and cultural landscape and it is therefore the main place for ecotourism.

6. “Organizational arrangements should be provided for the involvement and participation of a suitable range of inter alia public authorities, local communities and private interests in the design and the carrying out of the functions of a biosphere reserve”.

In the design and implementation of biosphere protection, the reserve fully respects the wills of public agencies, local communities and private organizations and gives full consideration to the interests of public agencies, local communities, the private group interests, takes in their opinions through the Coordination Committee, seminars, conferences and questionnaires, organize, guide and encourage them to actively participate in the resources conservation, economic development and logistical support of the reserve. The Reserve...
belongs to all the people, so its functions should benefit people living in the reserve, and they are the important force to promote the reserve's rapid and healthy development. For example, the reserve has set up the Coordination Committee composed of 55 people from various parties in the reserve, including 28 members from Wudalianchi Management Committee, 6 members from surrounding county and city governments and 21 members from other areas. Two meetings will be held annually.

Choose and determine a certain time and area for a certain number of legitimate stakeholders to conduct legal productive activities under the supervision and management of the reserve management institution and make them become direct participants and managers for utilization and protection of waters, wetlands and forests by means of paid use of natural resources or additional obligations for resources share, so as to achieve the objective of “maximizing the joint interests of resource conservation and rational exploitation and management, minimizing the management costs, conflicts and disputes”. Under the premise of achieving the full protection, the scientific and rational planning and construction have helped community residents to find a suitable alternative industries, and the reserve is gradually developed into a multi-functional integrated ecological demonstration zone with the community co-management, ecological protection, rational exploitation and sustainable use.

7. Mechanisms for implementation:

a) Mechanisms to manage human use and activities

The resource use and management of activities are conducted through cooperation mechanisms; the reserve management adheres to strict protection, scientific planning, unified management, rational development and sustainable use; establish and improve various rules and regulations, strictly comply with the legal framework of World Network of Biosphere Reserves, strictly execute relevant national laws and regulations and the overall planning on protection, strengthen management measures, crack down on acts of destruction of resources and environment, establish and improve the scientific research and monitoring system, and increase environmental protection and science propaganda.
b) Management policy or plan

Achieve the objectives of the biosphere reserve through the planning and planning revisions, such as “Heilongjiang Wudalianchi Volcano Geological Heritage National Nature Reserve Master Plan”, “Heilongjiang Wudalianchi Geopark Protection Ordinance”.

c) Authority or mechanism to implement this policy or plan

Wudalianchi Management Committee is responsible for the implementation of various planning policies. Wudalianchi Management Committee offers various departments to manage and supervise the conservation, development and support functions of the reserve, and the main sectors include Planning and Construction Bureau, Land Resources Protection Bureau, Tourism Wellness (area) Authority, the Environment Protection Bureau, Council of Agriculture, Planning and Comprehensive Law Enforcement Bureau, Forestry Bureau, Animal Husbandry and Fishery Bureau, Water Supplies Bureau, Environmental Monitoring Station, Volcano Monitoring Station and so on. Various departments carry out the effective protection on protect the region’s natural and human resources through managing stations and communities.

Establish the Coordination Committee, the Advisory Committee, Environmental Associations, establish the special planning committees and advisory boards, invite relevant competent authorities, agencies, stakeholders, experts, scholars and representatives of the surrounding community to attend such organizations to draw on the wisdom of the masses and help develop eco-development plan and raise funds via multiple channels.

d) Programmes for research, monitoring, education and training

**Scientific research.** Carry out a large number of scientific research projects in the reserve, such as “Wudalianchi Geothermal Resources” supported by Heilongjiang Provincial Land Resources Department; Wudalianchi Management Committee cooperates with Heilongjiang Academy of Sciences to implement cooperation projects to make general survey on Wudalianchi plants and establish plant names; Wudalianchi Management Committee joint cooperation projects with the Northeast Agricultural University on Dryopteris fragrans' medicinal value and application; the science training program supported by NDRC “Wudalianchi biological museum project”, and the cooperation projects with Far East Branch
of the Russian Academy of Sciences Volcano and Earthquake Research Institute, Harbin Institute of Technology, Inner Mongolia University, the Provincial Water Institute, the Provincial Fisheries Research Institute on such areas as volcanoes and mineral resources utilization, Northeast green village demonstration technology, plant resources application, geothermal resources application and fish farming in the mineral water. More than one thousand high-level academic articles have been published, including “Special Function of Comparison between Wudalianchi with other single-origin volcanic facies in Central Europe”, “Exploration on Wudalianchi volcanoes eruption cone formation mechanism”, “Wudalianchi ecological value analysis” and so on. These scientific research results have enriched and expanded Wudalianchi scientific system, expanded the influence of Wudalianchi in the International Geological Ecology Circle and played an important role in the protection and management.

**Monitoring.** Wudalianchi Management Committee has established the reserve monitoring system comprising the management monitoring system and the technology monitoring system. Now four levels of monitoring departments have been established, including national monitoring agencies: Wudalianchi volcanic earthquake monitoring station, Heilongjiang Provincial monitoring agencies: Heilongjiang Wudalianchi environmental monitoring station, Heilongjiang Academy of Sciences, Institute of volcanoes and mineral springs; Heihe municipal monitoring departments: Heihe City Municipal Environmental Protection Bureau and Heihe Bureau of Meteorology; Wudalianchi Management Committee internal monitoring departments: department of land, water sector, the forestry sector, animal husbandry and aquaculture sector, the tourism sector, environmental protection department and so on. Cooperate with domestic universities and research institutions to carry out monitoring activities, such as the cooperation with Inner Mongolia University to establish Wudalianchi plant community monitoring; the cooperation with Environmental Monitoring Station of Heilongjiang Province to carry out Wudalianchi water body monitoring; cooperation with Heilongjiang Provincial Academy to establish the biological database management system, as well as the biosphere geographic information systems training, protection of wild plants, construction and management of biosphere reserves and other
projects. Heilongjiang Institute of Hydrogeology and Engineering Geology Hydrogeology have investigated respectively the hydrogeology, mineral water distribution and geothermal resources. CAS Nanjing Institute of Geography and Limnology has repeatedly monitored Wudalianchi dammed lake water quality and sediment changes. Jilin University, Zhejiang Institute of Geological Survey, Inner Mongolia University, Northeast Forestry University have successively investigated Wudalianchi flora, fauna, biodiversity. Heilongjiang Fisheries Research Institute has conducted a comprehensive survey of fish resources in the reserve.

**Education and training.** Hire experts and scholars at home and abroad to conduct the technical guidance on the scientific value of reserves, and organize various training activities, which are related to geological heritage protection, biodiversity conservation, environmental protection and monitoring, scenic area planning, tourism management, resource protection, scenic legal regulations, forest fire prevention, computer monitoring information systems and applications and so on. Participate in professional training or seminars organized by UNESCO or national/provincial research institutions and organizations to lay a solid foundation to improve the management technical capacity of the reserve. In 2004, Wudalianchi Geopark Museum, visitor center, Biosphere Science Museum, volcanic earthquakes Exhibition have been built to demonstrate knowledge, biodiversity, resource protection and development to the mass visitors and residents. Wudalianchi geological structure and ecosystem evolution process have been displayed through specimens, images, text and pictures. Wudalianchi World Biosphere Museum integrating sound/light/electricity is under construction. More than 1,000 explanation boards and signposts have been added in such major geo-ecological science expedition resorts as Heilong mountain, Huoshao mountain, Longmenshizhaishan, Wenbo and Bindong, etc. Guide words, travel guides, photo collections, popular science books, promotional brochure, selected poems, stamps and other tourist brochures have been published. China Weather Channel shot seven episodes of Chinese geography adventure Wudalianchi feature program. CCTV, German National Television, Central Newsreel and Documentary Film Studio shot 11 Wudalianchi science documentaries. Carry out more than 50 geological and ecological science camp where a total of 5,000 people have been educated every year. Regularly hold “science activities Week”, “Earth Day”, “World Environment Day”
and other popular science education activities. Set the science knowledge column in the website of the reserve. China University of Geosciences, Northeast Forestry University, Capital Normal University, Inner Mongolia University and other research institutes have established in Wudalianchi teaching practice and research practice bases.

Does the biosphere reserve have cooperative activities with other biosphere reserves (exchanges of information and staff, joint programmes, etc.)?

At the national level:

At the national level, the reserve has signed cooperation agreements with Hong Kong Global Geopark, Henan Baotianman, Hainan Leiqiong, Zhejiang Yandang Mountains, Shaanxi Zhongnan Mountains, Danxia Mountain in Guangdong, Inner Mongolia Saihanwula, Yunnan Stone Forest and many other well-known biosphere reserves and geological parks at home. In 2012, the young managers were sent to 11 domestic advanced reserve including Taishan in Shandong, Anhui Huangshan Mountains, Shanqingshan in Jiangxi Province, Hangzhou West Lake, Jiuzhaigou in Sichuan, Yunnan Tengchong, Xishuangbanna for the testing exercise. Through the regular exchange of visits, electronic communications and other means of information exchange, Wudalianchi has strengthened the exchanges and cooperation with other reserves in science and culture and environmental protection, learn advanced experience and practices from each other in terms of resource protection and management approaches, innovation management ideas to improve the level of protection and sustainable development.

In the world network, actively participate in the biosphere network exchanges, participate in the sixth and seventh Network Conference of China biosphere, “Man and Biosphere” program fortieth anniversary and the 13th General Assembly Network of Biosphere Reserves.

At the regional level:

Wudalianchi Management Committee leadership attended the Eleventh Conference of East Asia Network of Biosphere Reserves;

Carry out exchanges and visits with South Korea Jeju Island Biosphere Reserve;

Through twinning and/or transboundary biosphere reserves:
The reserve has formed twinning biospheres with Jilin Changbai Mountain, Henan Baotianman, Mongolia Saihanwula, Heilongjiang Fenglin, Heilongjiang Xingkaihu and many other well-known biospheres at home.

It has also reached twinning biosphere with Jeju Island in Korea, Italy Cilento and reached the twinning biosphere intentions with Hawaii World Biosphere Reserve.

Within the World Network:

The reserve has participated in the 11th Conference of East Asia Network of Biosphere Reserves and carried out exchanges and cooperation with Italy Cilento, Jeju Island, Korea, Hawaii World Biosphere Reserve. In May 2011, more than 70 domestic and foreign experts participated in Harbin “International Symposium on Volcano Reserve Geological and Ecological Value.” In April 2013, in order to further promote the Wudalianchi Geopark science education and strengthen the cooperation and exchange with other world geoparks, Wudalianchi Geopark Management Committee vice chairman Yao Yu led a delegation to visit British Marble Arch Caves Global Geopark.

Obstacles encountered, measures to be taken and, if appropriate, assistance expected from the Secretariat:

Although the Biosphere Reserve has made positive progress in resource protection and infrastructure construction, there are still some problems to be solved. First, the investigation of biological diversity is to be further deepened, and the investigation in plants and animals is jogging along due to the lack of funds. Second, the science education needs to be strengthened. The reserve is building a large museum integrating sound, light, electricity in one, with high science features and complete facilities. But it is logging behind due to the lack of fund and it is in urgent need of support from higher authorities.

Main objectives of the Biosphere Reserve: Describe the main objectives of the biosphere reserve integrating the three functions and the sustainable development objectives for the coming years.

In the future management, protection and development, the reserve should further strengthen ecological, health, leisure, cultural protection zones construction, strict control human activities in the core area, reduce the threat and environmental pollution caused by
residents and businesses living and production activities in the buffer zone and the transition area on the ecological, further strengthen the capacity for sustainable development of reserves, achieve multi-win in protection, development and logistical support, improve the living standards of local residents, and promote coordinated development of communities and reserves, continue to promote and demonstrate the model with harmony between man and nature, ecological civilization and sustainable economic development.

Protection functions: Establish a relatively sound ecological network. All farmlands in the core area are returned to woodland and restored to a natural state (meadow or woodland meadow). Establish a reserve with good ecological function and beautiful landscape, and, at the right time, gradually restore the farmlands in the ecological corridor, shield-shaped mesa in the buffer zone into the farmland and wetlands. Accelerate the construction of protective equipment and prevent the degradation of ecosystem services which may be caused by human activities.

Development function areas: Develop high-end tourism products, and transfer from traditional sightseeing tours to eco-tourism and science expedition tour. The current single tour is transferred into the volcano culture connotation in-depth experience based on resource protection, increase participatory and experiential tourism products; on the basis of effective protection in mineral resources, build the health care industry with minor environmental impact into the core brand of Wudalianchi, transfer from the sightseeing tourism to the vacation type tourism; within reasonable limits, develop the mineral water industries, specialty ecological agriculture, promote the sustainable development of local communities and residents.

Logistical support areas: Further establish and improve the independent and long-term stable research and monitoring bodies, and establish a more comprehensive monitoring network system. Establish sustained, effective scientific cooperation mechanism with multifaceted, multi-level experts, educational institutions and research institutions, and provide a good environment for scientific research activities; further enrich the research contents and methods, organize high-level and influential domestic and international seminars as well as special inspection activities. Actively participate in domestic and international
biosphere network events and meetings, strengthen exchanges and cooperation between members of the network, enhance the MAB network awareness in China, and strive to contribute to the World Network of Biosphere Reserves.

9. SUPPORTING DOCUMENTS

[List of the annexes submitted with periodic review report.

(1) Updated location and zonation map with coordinates

[Provide the biosphere reserve’s standard geographical coordinates (all projected under WGS 84). Provide a map on a topographic layer of the precise location and delimitation of the three zones of the biosphere reserve (Map(s) shall be provided in both paper and electronic copies). Shapefiles (also in WGS 84 projection system) used to produce the map must also be attached to the electronic copy of the form. If applicable, also provide a link to access this map on the internet (e.g. Google map, website...)

Biosphere standard geographic coordinates is shown in Figure 2.2.1.
Wudalianchi World Biosphere Reserve function zoning map is shown in Annex 9-1.

(2) Updated vegetation map or land cover map

[A vegetation map or land cover map showing the principal habitats and land cover types of the biosphere reserve should be provided, if available.

Wudalianchi World Biosphere Reserve land use and vegetation distribution comparison chart is shown in Annex 9-2

(3) Updated list of legal documents (if possible with English, French or Spanish synthesis of its contents and a translation of its most relevant provisions)]If applicable update the principal legal documents since the nomination of the biosphere reserve and provide a copy of these documents.

The upgraded list of legal documents is shown in Annex 9-3-1.

“Heilongjiang Wudalianchi Geopark Protection Ordinance” is shown in Annex 9-3-2.

(4) Updated list of land use and management/cooperation plans [List existing land use and management/cooperation plans (with dates and reference numbers) for the administrative area(s) included within the biosphere reserve. Provide a copy of these documents. It is
recommended to produce an English, French or Spanish synthesis of its contents and a translation of its most relevant provisions.

Heilongjian Wudalianchi scenic nature reserve management structural adjustment program is shown in Annex 9-4.

(5) Updated species list (to be annexed) [Provide a list of important species occurring within the proposed biosphere reserve, including common names, wherever possible.]

Wudalianchi World Biosphere Reserve plant updated list is shown in Annex 9-5-1.

Cooperate with Heilongjiang Provincial Academy of Sciences, Inner Mongolia University, Northeast Forestry University and other research institutes to conduct the botanical surveys and verification. 36 species newly found in Wudalianchi World Biosphere Reserve are shown in Annex 9-5-2.

Wudalianchi World Biosphere Reserve animal updated list is shown in Annex 9-5-3.

Wudalianchi World Biosphere Reserve endangered animals list is shown in Annex 9-5-4.

(6) Updated list of main bibliographic references (to be annexed) [Provide a list of the main publications and articles of relevance to the proposed biosphere reserve.]

Wudalianchi World Biosphere Reserve updated list of the main bibliographic references is shown in Annex 9-6.

(7) Further supporting documents.

2003-2012 Wudalianchi World Biosphere Reserve conservation project funding schedules is shown in Annex 9-7-1.

Wudalianchi World Biosphere Reserve management and protection stations and monitoring facilities status map is shown in Annex 9-7-2.

Wudalianchi World Biosphere Reserve hydrogeological map is shown in Annex 9-7-3.

Wudalianchi World Biosphere Reserve land use map is shown in Annex 9-7-4.

Abiotic and biodiversity variables are shown in Annex 9-7-5.

10. ADRESSES

10.1 Contact address of the proposed biosphere reserve:
[Government agency, organization, or other entity (entities) to serve as the main contact to whom all correspondence within the World Network of Biosphere Reserves should be addressed.]

Name: Qu Shuguang
Street or P.O. Box: 1 Yaoquan East Road, Heilongjiang WUDALIANCHI Nature Reserve
City with postal code: Heihe 164155
Country: People’s Republic of China
Telephone: +86-456-7222931
E-mail: hbj16410@163.com
Web site: http://www.wdlc.com.cn

10.2. Administering entity of the core area(s):
Name: Qu Shuguang
Street or P.O. Box: 1 Yaoquan East Road, Heilongjiang WUDALIANCHI Nature Reserve
City with postal code: Heihe 164155
Country: People’s Republic of China
Telephone: +86-456-7222931
E-mail: hbj16410@163.com
Web site: http://www.wdlc.com.cn

10.3. Administering entity of the buffer zone(s):
Name: Qu Shuguang
Street or P.O. Box: 1 Yaoquan East Road, Heilongjiang WUDALIANCHI Nature Reserve
City with postal code: Heihe 164155
Country: People’s Republic of China
Telephone: +86-456-7222931
E-mail: hbj16410@163.com
Web site: http://www.wdlc.com.cn

10.4. Administering entity of the transition area(s):
Name: Qu Shuguang
Street or P.O. Box: 1 Yaoquan East Road, Heilongjiang WUDALIANCHI Nature Reserve
City with postal code: Heihe 164155

Country: People’s Republic of China

Telephone: +86-456-7222931

E-mail: hbj16410@163.com

Web site: http://www.wdlc.com.cn
Annex I to the Biosphere Reserve Decennium Review Statement, January 2013

MABnet Directory of Biosphere Reserves

Administrative details (7.6)

Country: People's Republic of China

Name of BR: Wudalianchi World Biosphere Reserve

Year designated: 2003

Administrative authorities: Wudalianchi Scenic Area Reserve Management Committee

Name Contact (10.1): Yan Guanmin

Contact address: (Including phone number, postal and email addresses) (10.1)

1 Yaoquan East Road, WUDALIANCHI Scenic Area, Heilongjiang Province, China, Postal Code: 164155

Telephone: (86) 456-7222931

Fax: (86) 456-7222931

E-mail: hjbj16410@163.com


Social networks: (6.5.4): Official microblogging, Wechat and other platforms, contact: Yan Guangmin

Description

General description:
Located in the extreme north-eastern part of the country, the Wudalianchi area is marked by relatively recent volcanism. It contains Mount Laohei and Mount Huoshao, which are China youngest volcanoes. Its conservation value derives from rich plant diversity dating from the tertiary period. Due to a mix of older and more recently erupted volcanic areas, the site is an ideal place in which to study the succession of pioneer plants on barren land. Tourism plays an important role in the area, primarily based on cold water springs with mineral water and spas and the area natural scenery. Environment-friendly green food is cultivated by using organic methods and rice in particular is irrigated by mineral waters rich in trace elements that are necessary for the human body. About 56,308 people live in the biosphere reserve. Their heritage and customs are very rich and have an important cultural significance in the area. Buddhist temples, statues, frescoes, gardens and folk festivals contribute to the social and economic well-being. Wudalianchi is also a well-researched site for geology, seismology and geomorphology. The construction of an educational museum based featuring volcanism is established. In 2001, the co-management committee of Wudaliachi Nature Reserve & Scenery Landscape Area was established in order to strengthen protection, exploitation, utilization and management of natural and touristic resources. This body was approved by the Heihe city government, institutions and farms.

**Major ecosystem type:** Including lichens and shrubs vegetation types of ecosystems, forest ecosystems meadow vegetation types, lowland and wetland meadow vegetation types of ecosystems, rivers, lakes, aquatic ecosystems, land ecosystems.

**Major habitats & land cover types:** Land cover types:

Major animal and plant habitats: Cold temperate mixed coniferous broad leaved forest, volcanic rock habitat types and rock plants, aquatic habitat types and aquatic plants, lava plateau shrub meadow habitat types, habitat types and meadow marsh, meadow habitat types forb meadow, forest habitats type.
Land cover types: Broad-leaved mixed forests, thickets, meadows, wetlands, lakes, fields, buildings.

**Bioclimatic zone:** Cold temperate continental monsoon climate zone

**Location** (latitude & longitude): North latitude 48°34′~48°48′, east longitude 126°00′~126°26′;

**Total Area** (ha): 10600000

**Core area(s):** 10614.61

**Buffer zone(s):** 13546.09

**Transition area(s):** 81839.30

**Different existing zonation:** There are three functional divisions, namely the core area, buffer area and transitional area

**Altitudinal range** (metres above sea level): 248-602.2 m

Zonation map(s) (refer to section 2.2.2): (see Annex 9-1)
**Main objectives of the biosphere reserve**

**Brief description**

Approximately 5 lines

Adhere to the purpose of the MAB Programme, in “Man and the Biosphere Programme,” “Legal Framework” 28C/2.4 resolution framework, make continuous development and improvement, build the biosphere reserves demonstration areas with harmony between man and nature, resources, economic and social sustainable development, and protect the biological diversity and cultural diversity, give full play to the protection, development and support functions of the World Biosphere Reserve, protect the world significant rare volcanic landscape and wildlife resources, rely on “Volcano and hot spring” advantages, develop the local industries, and actively carry out research, training, monitoring, public environmental education, domestic and international exchanges and cooperation; increase the harvest of local residents, and create Wudalianchi World Biosphere Reserve model through the protection of wildlife resources, tourism, health & Wellness, mineral industry, scientific investigation, etc.

**Research**

**Brief description**

Approximately 5 lines

Since 2003, scientists have made systematic study on the structure and functions of different regions in the reserve and predicted the human-induced biosphere and resources changes and the relevant impacts for residents living style in Wudalianchi World Biosphere Reserve. Research areas include reserve plants, animals, biodiversity, volcanoes, geology, mineral water, ecological value and ecological tourism. More than 1,000 higher-quality articles have been published and relevant reports have also been published on newspapers.
**Monitoring**

**Brief description**

Approximately 5 lines

After joining the World Network of Biosphere Reserves, Wudalianchi World Biosphere Reserve has constantly improved the monitoring measures and technologies. The reserve has established Wudalianchi volcanic earthquake monitoring station, Heilongjiang Academy of Sciences, Institute of volcanoes and mineral springs, Heilongjiang Wudalianchi environmental monitoring station, automatic air monitoring stations and other research institutions, as well as other research institutions which will regularly monitor Wudalianchi volcanic earthquakes, mineral water, surface water, air, plants and animals. These activities aim at providing basic information for scientific research and scientific data for Wudalianchi World Biosphere Reserve to perform its protection, development and support functions.
AGREEMENT GRANTING NON-EXCLUSIVE RIGHTS

Reference:

1. a) I, the undersigned, copyright-holder of the above mentioned photo(s) hereby grant to UNESCO free of charge the non-exclusive right to exploit, publish, reproduce, diffuse, communicate to the public in any form and on any support, including digital, all or part of the photograph(s) and to licence these rights to third parties on the basis of the rights herein vested in UNESCO.

b) These rights are granted to UNESCO for the legal term of copyright throughout the world.

c) The name of the photographer will be cited alongside UNESCO’s whenever his/her work is used in any form.

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a) I am the sole copyright holder of the photo(s) and am the owner of the rights granted by virtue of this agreement and other rights conferred to me by national legislation and pertinent international conventions on copyright and that I have full rights to enter into this agreement.
b) The photo(s) is/are in no way whatever a violation or an infringement of any existing copyright or licence, and contain(s) nothing obscene, libellous or defamatory.

Name and Address:
Radio and TV Station of Wudalianchi National Park, Heilongjiang Province.
Si Yongchao

Signature: Si Yongchao Date: August 5th, 2013.

(Sign, return to UNESCO two copies of the Agreement and retain the original for yourself)

Mailing address: 7 Place Fontenoy, 75352 Paris 07 SP, Direct Telephone: 00331 – 45681687
Direct Fax: 00331 – 45685655; e-mail: photobank@unesco.org, m.ravassard@unesco.org
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b) The photo(s) is/are in no way whatever a violation or an infringement of any existing copyright or licence, and contain(s) nothing obscene, libellous or defamatory.

Name and Address:
Publicity Department of Mudalanchi National Park, Heilongjiang Province, China.

Sue Peng
Signature: Sue Peng
Date: August 6th, 2013.

(Sign, return to UNESCO two copies of the Agreement and retain the original for yourself)

Mailing address: 7 Place Fontenoy, 75352 Paris 07 SP, Direct Telephone: 00331 – 45681587

Direct Fax: 00331 – 45685655; e-mail: photobank@unesco.org; m.ravassard@unesco.org